

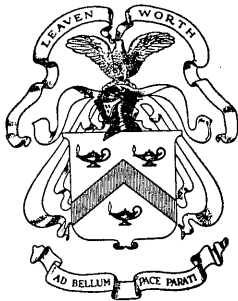
**SPECIAL BULLETINS  
FROM THE 1939 - 1940  
ACTIVE CAMPAIGN IN EUROPE**

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**LESSONS 11 - 20**

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## SPECIAL BULLETINS, M.I.D., W.D.

Nos. 11 - 20

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|--------------|-----|--|
| Bulletin No. | 11: | British tank operations in the vicinity of Arras, May 19-23, 1940. (August 22, 1940)                                     |
| "            | 12: | French tanks and armored cars. (August 29, 1940)   |
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| "            | 15: | Rhine crossing and penetration of the Maginot Line (The German Colmar operation, June 15-16, 1940). (September 23, 1940) |
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Special Bulletin No. 11

by authority of AC of S, G-2, WDGS August 22, 1940

by

BRITISH TANK OPERATIONS IN THE VICINITY OF  
ARRAS, MAY 19-23, 1940.

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I. INTRODUCTION.

A. General Situation Created by the German Advance,  
May 10 - 21.

The invasion of the Low Countries began at daybreak on May 10, when the Germans crossed the borders of the Netherlands, Belgium, and Luxembourg, and simultaneously launched air attacks against the Netherlands, Belgium, and France. The story of the German advance is too familiar to call for elaboration, but as an introduction to the limited operations of May 21, 22, and 23 in the vicinity of Arras, some mention of its more important phases may well be made.

On May 11 Fort Eben Emael, one of the strongest Allied forts, was surrendered; the following day the Germans claimed that Luxembourg was in their hands, and on May 14 they reported the capitulation of Rotterdam, although the Dutch stated that their troops were still holding the northern part of the city. By May 16 Amsterdam and The Hague were claimed by the Germans, and it was admitted by the French that the invader had pushed westward through Belgium to the Meuse between Namur and Sedan. The Germans said they had crossed the Meuse in several places, including points near Sedan.

According to German accounts, Brussels capitulated May 18, and on the same day, south of Maubeuge, German armored corps pierced French frontier defenses, smashed two enemy divisions, and pursued retreating forces over the Upper Sambre and as far as the Upper Oise. The following day the Germans crossed the Oise and claimed the capture of St. Quentin, although the French did not admit this loss. They reported that, to the southwest, they had taken Fort 505 of the Maginot Line and had reached the district north of Laon, as well as the Aisne River near Rethel, "with heavy forces." The French claimed to have repulsed an attack upon Montmedy.

Meanwhile the advance continued in other quarters. The Germans reported that all the Netherlands was in their hands on May 19 and that, on the following day, the British were hurrying toward the Channel ports in forced marches.

On May 20 near Maubeuge, according to German reports, a French-Belgian army, thwarted in an attempt to retreat southward, started to move westward. Southwest of Maubeuge, German tanks and motorized units reached the Somme Battlefield of 1916 on the Cambrai-Peronne Road.

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The Germans claimed the defeat of the Ninth French Army, located along the Meuse between Namur and Sedan, and the capture of its staff and headquarters on May 21. Armored cars and motorized troops, they said, took Arras, Amiens, and Abbeville, and all French and Belgian armies north of the Somme were being pushed toward the Channel. On the same day they claimed the capture of Rethel, the capture of Laon, and an advance as far southwest as the Aisne-Oise Canal.

## II. LIMITED TANK OPERATIONS ABOUT ARRAS.

The following account, based upon eyewitness reports, was obtained from a high British official source.

### A. Operations South of Arras, May 19 - 21.

"By May 19 the Germans had made a gap in the line from Arras to Cambrai some 20 miles in width, and through this gap they had poured great numbers of troops who had encircled the British and French troops to the north. Up to this date the French had made little attempt to close the gap; it was believed, however, that at long last they had concentrated the necessary forces south of the Somme to counterattack northwards via Cambrai, with a view to cutting these very vulnerable enemy communications.

"In order to support these operations, G.H.Q. was very anxious to take any possible steps to launch even a small offensive southwards from Arras. The troops of the B.E.F. were already very much extended, and there were very few reserves; nor had the French any fresh troops in that area for such actions.

"On the evening of May 19, the Commander-in-Chief saw the general officer commanding the 50th Division and informed him that at any rate a portion of his division would be sent south to Arras for this purpose, and that the 1st Army Tank Brigade would also be sent and placed under his orders. The 50th Division had left the 25th Infantry Brigade Group to fight on the River Dendre behind Brussels, and the 151st Brigade Group was in position on the La Basse Canal. The 150th Brigade Group was in hand. (Note: The strength of the British infantry brigade is a headquarters company, 3 infantry battalions, and one antitank company of nine 25 mm. guns, with a total of about 2100 men. This approximates the strength of the American infantry regiment. G-2.)

"A little later, it was decided that the 5th Division would also be sent to Arras for this purpose, and the senior commander, Major General Franklyn, took command.

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"The 50th Division moved south as fast as possible with the 150th Infantry Brigade Group and reached Vimy, just north of Arras, at mid-day on May 20. It was decided that the 25th Infantry Brigade Group, which had suffered fairly heavy casualties on the Dendre, should replace the 151st Infantry Brigade, and the latter would then be free to rejoin the 50th Division at Vimy early on May 21.

"In the meantime the 13th Infantry Brigade, which was the leading brigade group of the 5th Division, had arrived at Vimy during the afternoon of May 20.

"On arrival at Vimy, it was clear that the town of Arras might be attacked at any moment. The garrison was both small and tired. The general officer commanding the 50th Division therefore sent one battalion, one antitank battery, and one field company as reinforcements. These were sent from the 50th Infantry Brigade.

"During the afternoon of May 20, Major General Franklyn, who became known as the general officer commanding Frankforce, arrived at Vimy and decided to relieve the French light mechanized division on the east of Arras with the 150th Infantry Brigade and the leading brigade of his own division. This was carried out after dark.

"The position was now fairly secure; Arras had been reinforced, and the two infantry brigades which were to relieve the French 1st Light Mechanized Division would hold the River Scarpe east of Arras without much difficulty. Moreover, this relief would give us the light mechanized division to cooperate with our offensive operations; they were tired troops, but they still had some 60 or 70 good tanks with thick armor.

"Late on the night of May 20, a conference was held by General Franklyn. A general discussion took place, but no detailed plan for offensive operations could be made, for no further troops had yet arrived. Moreover, the tactical situation might well change before this happened.

"The 151st Infantry Brigade Group and the 1st Army Tank Brigade arrived during the early hours of the morning of May 21 after a tiring journey. The 50th Division sent them instructions to obtain all possible rest for a few hours preparatory to carrying out reconnaissances and a forward move to assembly areas for an attack.

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"At 0600 hrs. on May 21, General Franklyn held a conference to settle the details of the plan for an attack. The general scheme was that the 50th Division, which consisted mainly of the 151st Infantry Brigade Group, was to attack in cooperation with the 1st Army Tank Brigade around the south of Arras and clear the area of the enemy as far around as the River Sensee. The general officer commanding the 50th Division was to command the attack, which was to be carried out in two phases; the first to the River Cojeul, and the second to the Sensee. During the second phase, the 13th Infantry Brigade Group of the 5th Division was to advance over the River Scarpe and cooperate. General Franklyn was in command of the whole operation and responsible for liaison with the French and for cooperation from the 5th Division. The attack was timed to cross the infantry start line on the Arras-St-Pol road at 1400 hrs.

"The operation resolved itself into clearing an area about 10 miles deep and 4 miles wide, and the commander of the 50th Division stated that he proposed to carry this out by advancing through the area with two small mobile columns. The area was, of course, much too large for a normal advance with troops extended on the front when only such a small force was available. He also asked that the time for passing the start line should be made 1500 hrs., as it was then 0700 hrs., and the troops had an 8-mile march to the start line in addition to the reconnaissances which had to be carried out. General Franklyn, however, pressed for the attack to be launched at 1400 hrs., and in point of fact, it was eventually launched at 1430 hrs.

"The troops had not been rested for several days and had passed a sleepless night. They had never, of course, received much training in working as a mobile column with tanks, and this was their first serious encounter with the Germans. The test was, therefore, a high one for a territorial division. The 1st Army Tank Brigade was not going to be employed in the role for which it had trained, but was given a task more suited to an armored division.

"Although the French troops had been in this neighborhood for several days, they had little idea as to what German troops opposed them. The general opinion was that the enemy had a few troops scattered about in the area and a considerable number of tanks. It was the latter which the French feared, although they possessed better tanks in fair numbers themselves.

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"With so little time and information available, it was not easy for the commander of the 50th Division to decide on the best tactics. If the opposition were chiefly tanks, then the right plan was to send our infantry tanks ahead to deal with them while the infantry and gunners followed up to secure the objectives. Infantry would be merely in the way in a battle of tank against tank. If, however, a defensive position were met, then close cooperation would be required between infantry and the tanks. The plan was therefore adopted of sending the tanks in a little ahead of each column. If enemy tanks were met, our infantry tanks with their thick armor should fend them off while the infantry followed up. If, however, a defensive position were met, then the infantry tanks would wait under cover until the infantry advanced and a combined plan was made.

"The 1st Army Tank Brigade, which had marched by road from Brussels, now had only 16 Mark II tanks, 58 Mark I tanks, and 12 light tanks available for operation. For the actual attack, the allotment of tanks was as follows: 7th Battalion, Royal Tank Regiment, 23 Mark I tanks, 10 Mark II tanks, and 5 light tanks; 4th Battalion, Royal Tank Regiment, 35 Mark I tanks, 6 Mark II tanks, and 7 light tanks.

"The two mobile columns, in addition to the tank battalions, each consisted of one infantry battalion, one anti-tank battery, one battery of 18 pounders, and one company from the machine gun battalion.

"Each column was commanded by the infantry battalion commander, and they duly arrived at their assembly areas - Maroeuil for the right column and Anzin St. Aubin for the left. At this point, the commanders of the tank battalions were able to have a brief discussion with the infantry commanders, and agreement was reached on the main points.

"The infantry on the left column arrived late, and the advance to the tank start line (line of railway 700 yds. south of and parallel to the Arras-Doullens Road) was further delayed by the fact that the enemy were found to be holding posts on our side of the start line. Those posts had remained silent during the preliminary reconnaissances, but it showed how little interest the French troops had taken in the enemy movements on this front.

"The French light mechanized division with some 60 tanks, was to advance on our outer flank to give us flank protection. The 8th Light Infantry Division was on the right,

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and the 6th on the left, while the 9th was kept in reserve. The center lines of advance of each column were:

"Right Column: Maroeuil - Duisans - Warlus -  
Wailly - Mercatel - Neuville -  
Henin-sur-Cojeul - Croisilles.

"Left Column: Anzin, St. Aubin - Dainville -  
Achicourt - Beauraines - Tilloy  
les Mofflaines - Wancourt -  
Cherisy.

"The 4th Battalion, Royal Tank Regiment, advancing in front of the left column, met the enemy almost at once to the west of Dainville. They shot up, with one section, a German motorized column which was advancing on Dainville from the west, killing many of the enemy and destroying their vehicles. The battalion met further opposition in the form of fire from anti-tank guns and enemy field batteries simultaneously with crossing the start line.

"Owing to the nature of the ground (i.e., railway cuts, etc.), the advance of this battalion was more to its right than it should have been until the River Crinchon was crossed. After crossing this stream, the correct line was followed.

"The 6th Light Infantry Division followed the tanks at some distance in artillery formation. There was a good deal of sniping and artillery fire, but the battalion continued the advance in a steady manner and mopped up the area around Dainville. Many prisoners were taken. The men had started rather tired from their march, but the sight of the damage caused by tanks and the fact that they were capturing and killing many Germans gave them new energy.

"The 4th Royal Tanks continued their advance on Achicourt, where the six Mark II tanks were told verbally by the commanding officer to deal with strong enemy antitank gun positions north of that place. Shortly afterwards, Company A, 4th Royal Tanks (in battalion reserve) was ordered to go into the attack between B and C Companies, which, by this time, had become separated.

"Very considerable antitank gun and field artillery opposition was met until the advance of the tanks was held up on the Arras-Bapaume road between Beauraines and Mercatel. Shortly before this, the battalion commander, Lieut.-Colonel J. G. Fitzmaurice, was unfortunately killed. He was commanding from a

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light tank which received a direct hit from a field gun of a battery sited east of Mercatel.

"It was now about 1600 hrs., and the 6th Light Infantry Division was seen advancing toward the Arras-Doullens Road. Touch was gained with the infantry by the adjutant of the 4th Royal Tanks, Capt. R. Cracroft, who informed them that there was no opposition on the ridge immediately in front. The 6th Light Infantry Division at this time was taking numerous prisoners, who were putting up no opposition.

"In the meantime, the right column had not been progressing quite so well. The 7th Battalion, Royal Tank Regiment, which was to lead the column, arrived rather late. It proceeded at once through Duisans, where it shot up enemy infantry and transport. It was followed by the 8th Light Infantry Division, which entered Duisans at about 1500 hrs. Some sniping and machine gun fire and a certain amount of shell fire were encountered crossing from the west, but casualties were slight. The whole area was mopped up, and about 100 prisoners were taken. Although tank crews and infantry were inevitably tired from their previous exertions, they were elated by these successes and by the sight of the damaged enemy transport and equipment caused by the leading tanks.

"At this stage, however, the advance of the 8th Light Infantry Division was held up at or around Warlus by the enemy, who were reported to be in some strength and supported by some tanks.

"At about 1530 hrs. the commander of the 50th Division arrived and saw that the left column was pushing ahead a good deal faster than the right column. He therefore ordered the left column to secure Beauraines, and made it into a tank proof locality. He then returned, at about 1600 hrs., to the right column where the situation was somewhat confused. The 7th Royal Tanks had continued their advance past Warlus and were well on their way to Wailly-Ficheux, which was strongly held by German field and antitank guns.

"About this time the 7th Battalion commander was put out of action. His tank had been hit by several field gun shells, which had damaged the track without injuring the crew. Later, Lieut.-Colonel Heyland was hit and killed by machine gun fire. As the adjutant's tank was also out of radio touch at this time, control was very difficult, and was only carried out by the use of liaison officers in

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light tanks. Enemy tanks were reported to be near Warlus. The division commander impressed on the right column commander the necessity to press hard and obtain further information, so that the necessary forces or artillery support could be brought to bear to clear a way through Warlus. Unfortunately, because of the fact that both tank battalions had been already committed, one to each column, and that the 3rd Battalion of the brigade had necessarily been left in England, there was no reserve of tanks in the brigade to deal with this situation. A little later the French tanks, which were advancing rather slowly on our right flank, saw our antitank guns, which were in position protecting the right of the 8th Division. They turned toward them, and the antitank battery presumed that they were French tanks, although they had no special marking visible. Suddenly the French tanks opened fire and knocked out one antitank gun, killing two men. Fire was then opened and one gun fired five shots, which killed or wounded the crews of four tanks. The tanks were now coming to close quarters, and the French saw their mistake and emerged from their tanks. Their commander apologized for their regrettable mistake.

"Meanwhile the 4th Battalion, Royal Tank Regiment, was continuing to push ahead. The adjutant of the battalion, Captain Cracroft, advanced into a shallow valley 1,000 yards northwest of Mercatel, where he found the remainder of the battalion. On this advance, antitank guns, armored cars, and miscellaneous stationery transport vehicles were spotted on the road running west of Mercatel. Some of these antitank guns were in position. He collected all available tanks and led the attack on to this road. This attack was successful, and very considerable damage was inflicted both on personnel and material. No further casualties were sustained by the tanks.

"Although the advance had been successful as a whole, it now became clear that the original proposal to reach the Sensee River could not be achieved. This plan had entailed an advance of some ten miles, which could obviously not be carried out against anything except the very lightest opposition. It was necessary now to decide on plans for that night and the following day, and the commander of the 50th Division returned to see the commander of Frankforce, General Franklyn, at Vimy. So far, heavy casualties had been inflicted on the enemy with only small losses on our side. It was, however, certain that the enemy would hit back and that he could do so presently with very superior forces. If we had possessed more troops immediately available to support these small forces which had penetrated so deeply into the enemy area, it would have been another matter, but such forces were

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not available. The 50th Division commander therefore suggested a withdrawal, as there did not seem very much object in retaining his troops in these very exposed positions. In view, however, of the necessity to make a demonstration south of Arras in support of the French counter-attack from the south, the 50th Division was ordered to hold the tank-proof locality at Beaudraines and another at Duisans after the situation at Warlus had been cleared up. Orders had already been sent out to both tank battalions to stand fast. The 4th Battalion had already taken up a forward rally position immediately behind the infantry, which was being subjected to heavy artillery fire from a battery due east of Mercatel. At the request of the forward company commander of the 6th Division, who thought the tanks were drawing this fire on them, the battalion was withdrawn another 400 yards and rallied there ready for counter-attack.

"The enemy were, however, very incensed at the successful attack which had been launched against them. They had complete superiority in the air and had watched the whole progress of the battle. As soon as they saw our columns collecting in their tank-proof localities, they made their plans for a counter-attack, for which they had already concentrated the necessary forces. Their general plan was simple and sound. They had no intention of attacking us if we held a strong defensive position, especially in an antitank locality. The plan was, therefore, to use an intensive air attack to drive us out of such a position and then launch a tank attack against us in the open, using large numbers of tanks and counting on catching the infantry before they could be protected by antitank guns.

"About 1815 hrs., the enemy launched very heavy dive bombing attacks on Beauraines, where the 6th Division was forming a tank-proof locality, and also on the main body of the right column near Warlus. These attacks were delivered by more than a hundred planes and lasted for 20 minutes. They were easily the most intensive air bombardments which our troops had yet encountered, and the men were already very nearly exhausted. The 6th Division was forced to extricate itself from Beauraines and was later attacked by a number of tanks in the open.

"The 4th Battalion, Royal Tank Regiment, though now somewhat reduced in numbers, stemmed the tide of the enemy advance. The details of the action on this part of the front are of interest.

"After the heavy German air attack, the infantry had withdrawn from Beauraines toward Achicourt, with the tanks at a forward rally 200 yards behind the forward line held by

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the infantry. It was just beginning to get dark by this time. As soon as the tanks were in position, the adjutant of the 4th Royal Tanks went forward about 200 yards to the crossroads 800 yards southeast of Achicourt and made contact with the infantry commander of the 6th Division. While talking to him, the adjutant heard tanks approaching along the road from the front. As it had been previously reported that a Mark II Tank of the 4th battalion had broken down on the ridge in front, it was thought that it was this tank returning. At the request of the infantry commander, the adjutant went to investigate. It was quite dark by this time and there was a considerable amount of smoke from fires burning in the vicinity. The leading tank had approached almost up to the crossroads. The adjutant stopped it by waving a bundle of maps in front of the driver's visor. Flaps were then opened and German heads appeared; there was some shouting in German. It was then realized that this was a German tank about the same size as a Mark II or a little bigger. The adjutant shouted a warning and ran back to his tank, a distance of about 250 yards. The German tanks, about five in number, started firing and took up a line along the road facing the 4th Battalion rally position, about 250 yards away. All tanks on both sides opened heavy fire, which was maintained for about 8 minutes, when it was realized that ammunition was being wasted, as fire could only be directed at approximate position of enemy tanks. A few of the enemy tanks were firing guns about the size of 2-pounders. A smoke candle was then effectively fired from a smoke projector to stop the firing. When the smoke cleared, firing broke out again, but shortly afterwards the German tanks withdrew. After this withdrawal by the enemy, both tanks and infantry of the left column withdrew to Achicourt.

"On the right flank the air bombardment was followed by tank attacks on the troops from the southwest of Duisans and on Warlus. Antitank guns were quickly in action under the direction of the commander of the 260th Antitank Battery of the 65th Antitank Regiment, Major Forrester. Second Lieutenant Spens, with one troop, was particularly successful, knocking out several German tanks, many of which were set on fire.

"After these attacks, it became clear that the enemy was in very superior strength, and both columns were ordered to withdraw. The 4th and 7th Battalions, Royal Tank Regiment, were rallied during the night at Ecurie. The darkness and the shortage of large scale maps made the withdrawal most difficult. During the early hours of May 22, both

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battalions returned to the Viny area, many tanks having been in action for some seven hours with crews inside them for 10 to 12 hours.

"To sum up, the result of the attack was that heavy casualties were inflicted on the enemy, and between 300 and 400 prisoners were taken. A total of some 20 enemy tanks were destroyed. Our infantry tanks showed a definite superiority over the enemy tanks. The armor of the Mark I and Mark II tanks resisted direct hits from enemy antitank guns quite easily, and the bursting of the shells had no effect upon the crews. Conversely, our 2-pounder gun penetrated all the enemy tanks, and the tracer often set the tanks on fire. The advance of five miles through enemy country, carried out by the 6th Division and the 4th Royal Tanks, showed remarkable powers of endurance, especially when it is remembered that the troops had had little rest and had had an approach march of 8 miles to the start line. The 8th Division and the 7th Royal Tanks on the right met stronger opposition, and the tanks on this flank lost contact with their infantry and advanced without them. The loss of the commanding officer, the adjutant, and the senior company commander of the 7th battalion increased the difficulties of command and control on this already extended front. The enemy counterattack during that evening was, however, resisted with success. Both the 4th and 7th Battalions, Royal Tank Regiment, showed great determination and fighting qualities. The number of tanks available and their mechanical efficiency had been considerably reduced by the long marches, which had necessarily been undertaken. If larger numbers of tanks had been available, properly supported by air, artillery, and stronger mobile forces, a very great success might have been achieved.

Points of Interest from This Action.

- (1) "The large number of enemy antitank guns (37 mm.) encountered.
- (2) "The vulnerability of the crews of these antitank guns. A burst of well directed .303 machine gun fire at the flash invariably silenced the guns, even up to ranges of 800 yards.
- (3) "Frontal siting of antitank guns. In no case was an antitank gun seen in a defiladed position. The guns were usually well concealed, but were clearly indicated by the flash of firing.

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(4) "The poor fighting qualities of the German troops encountered. They were very young, and large numbers were observed lying on the ground face downwards feigning dead; others ran up to the tanks, surrendering.

(5) "The accuracy of the German field batteries and the efficient spotting of German observation planes. Targets were rapidly and effectively engaged by these batteries.

(6) "Lack of support of any description from our own artillery during the attack.

(7) "Lack of support from our own air force and no defense against enemy bombers or reconnaissance machines.

(8) "Long distances covered by the tanks during the previous week. Both battalions had arrived at Brussels during the night of May 14-15 by rail, had left Brussels by road during the afternoon of May 17, and had marched continuously since that date before going into this battle. Thus they covered about 120 miles in five days. The strain on crews and tanks had been great and had led to losses of tanks because of mechanical failure. The speed of Mark I tanks is about 3 m.p.h.; of Mark II tanks, about 6 m.p.h.

(9) "Armor. Both Mark I and Mark II tanks were definitely proof against the German 37 mm. antitank gun.

"One tank shows 14 direct hits and another 24, including two hits from the gun of the German tank that appeared in the semi-darkness on the 4th Battalion front. Ranges varied from 150 yards to 250 yards. The only indication the crew had of being hit was a red glow for a few seconds on the inside of the armor plate.

"Another Mark I was hit three times by a French Somua tank without any ill effects. The mark on the outside of the armor plate was only 1/10th of an inch deep.

"Although on frequent occasions tanks passed through heavy enemy artillery fire, nothing but a direct hit from their field gun (105 mm. gun-howitzer) affected them. One tank commander reports that a shell burst just above the radiator of the Mark I and that the crew suffered slight concussion only. There was no damage to the tank. This shot was probably from the German 75 mm. infantry gun (14-lb. shell) and not the 105 mm. gun-howitzer (33 lb. shell).

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(10) "Tracer Ammunition. This was most effective, and it is essential to have a proportion of tracer, 1 in 4 in each belt of small arms ammunition. Conversely, penetration of tracer ammunition through the front louvres of the Mark II tanks caused fires in some of our tanks.

(11) "Radio. Radio communication inside battalions broke down early in the battle. This was partly due to lack of time for netting, bad atmospherics, and casualties to commanders' tanks. Two commanding officers, one adjutant, and two company commanders were lost.

"There was intermittent radio communication with battalion liaison officers (Anchor sets) from brigade headquarters. Communication was maintained through liaison officers and by sending each message with light tanks. The width of front and depth of advance made this a slow and difficult affair.

"During the evening, when radio communication was established with the 7th Battalion, the enemy definitely tried to jam but without much success."

#### B. Operations North of Arras

##### 1. May 22.

"During the morning and early afternoon, the 1st Army Tank Brigade returned to the Vimy area from the brigade rallying point at Ecurie. All vehicles were widely spaced out, as German aircraft were very active, and roads were continually machine gunned and bombed. The move was successfully completed. The 7th Battalion, Royal Tank Regiment, now under the command of Major H. F. G. Barrett, took up a position on the Givenchy Ridge covering the Souchez Gap.

"Casualties, chiefly of a mechanical nature, had reduced the fighting strength of the battalion to that of a strong company. It had 7 Mark II tanks and 13 Mark I tanks.

"In the evening it became apparent that a German threat was developing on the right flank in the general direction of Mont St. Eloi. In view of this, the 4th Royal Tanks, which now had about 14 Mark I's, were moved up on to the Vimy Ridge and concealed in the trees on the west side of the main Vimy-Arras Road, with the role to counterattack any enemy advance from Arras and west of it toward the Vimy Ridge. The 7th Royal Tanks remained on high ground east of Souchez, with a role of protecting the right flank of the divisional reserve position (Vimy Ridge) and covering the Souchez Gap."

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2. May 23.

"During the early morning, Major General Franklyn ordered the commander of the 1st Army Tank Brigade to coordinate the Allied tank forces (British and French) for the defense of the area. The brigade commander visited General Prioux, commanding the French cavalry corps in Petit Vimy, and also General Picard, commanding the 1st Light Mechanized Division. From General Picard and from Commandant Pinon he gathered that in the Souchez-Neuville-Mont St. Eloi area there were some 30 Somua and 24 Hotchkiss tanks.

"The importance of clear distinguishing marks on tanks was again emphasized during the visit to General Picard at Neuville, where a French 75 mm. battery fired some ten to fifteen rounds at one of their Somua tanks at a range of 800 to 1,000 yards. Fortunately the tank was not hit before this regrettable mistake was discovered.

"It was agreed with the French that some 10 Somua tanks would support our 17th Infantry Brigade, commanded by Brigadier Stopford. This infantry brigade was now holding a line on the River Scarpe from Mont St. Eloi (excl.) to Arras (excl.), with brigade headquarters at Ecurie. Another ten Somua tanks would watch Mont St. Eloi, all of them on counter-penetration role. The remainder of the Somua tanks were concentrated about Souchez. Later all the Hotchkiss tanks moved northwest through Souchez to meet a German threat in that direction.

"About 1100 hrs., a heavy German attack on Mont St. Eloi developed, and the right flank of the 17th Infantry Brigade was turned. The commander of the 1st Army Tank Brigade saw Major Garrett, commanding the 7th Royal Tanks, who now had the majority of his tanks on the high ground northwest of Souchez near the cemetery, and ordered him to move south through Souchez, leaving one company to face north and northwest.

"Accompanied by Major Garrett, a reconnaissance was made to find a suitable position from which to deal with the German attack, which could be seen advancing on the general line Mont St. Eloi - Givenchy. The position selected was south of Carency on a ridge flanking the German advance. Major Garrett led A and B Companies to meet the attack and ordered D Company to hold the Souchez Gap.

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"The German advance was making progress as these two weak companies arrived on the ridge. The German tanks leading their advance appeared to be of the same size as our Mark II. They made use of smoke, but several were knocked out by the fire of our 2-pounder antitank guns. French Somua tanks were cooperating on the right flank. The combined action of the 7th Battalion and the French successfully stopped the German attack, and the enemy withdrew.

"Unfortunately, Major Garrett was killed by machine gun fire about this time, while directing operations outside a tank.

"The 7th Battalion rallied near Souchez about 1400 hrs., where Major Parkes took over command. It still continued to defend the right flank of the Vimy Ridge position. Information was received from the French of a further German attack to the northwest. The battalion was accordingly moved back again to the Notre Dame de Lorette Ridge. From an O.P. near the Cemetery Memorial a German motorized column could be seen out of range in the direction of Villers au Bois-Mont St. Eloi, lined up in close order. The column then moved in the direction of Souchez.

"All available tanks of the 7th battalion (some 14 to 15) were disposed to meet this new threat. Two sections were left to hold the Lorette Ridge, two sections to hold the outskirts of Souchez in collaboration with the French, and one section under the acting battalion commander advanced through Souchez toward Carinel in the direction of the German advance. This section met German antitank guns covering the blazing barricade in Carinel as well as German infantry, who had apparently de-bussed and were advancing toward an assembly area at the foot of the Lorette Ridge. These were successfully engaged by fire and the assembly area sprayed with machine gun fire.

"The acting battalion commander withdrew again to the Lorette Ridge, leaving one section to cover Souchez.

"When the positions on the ridge were taken up, small parties of infantry were observed from time to time at several points approaching the position. No great fire effect, however, could be obtained on these parties because of their skillful use of cover.

  
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"It was by this time approaching dusk, and, in accordance with previous instructions, arrangements were made to withdraw to the Givenchy Ridge on the east side of Souchez. While this withdrawal was in progress, an attack of German tanks and infantry developed against the ridge. This was engaged by two Mark II tanks, one forward of the Givenchy Ridge and one to a flank at the foot of the ridge covering the withdrawal of the remainder. Enemy tanks were of light and medium type; four or five were knocked out. It was not easy to observe fire effect, owing to the fading light, and toward the end, fire was confined to shooting in the direction of the enemy gun flashes. Two of our Mark II tanks had to be abandoned eventually because of serious mechanical trouble (gearbox and rackhams) and consequent inability to get away, but all ammunition was first expended.


"There is no doubt that the action of the 7th Battalion, Royal Tank Regiment, throughout May 23, with its reduced number of tanks, definitely held up the German advance toward Lens and saved the right flank of the 5th and 50th Divisions, all under the command of Major-General Franklyn, from being turned.

"The 1st Army Tank Brigade had been told that the battle was to be fought out on the Vimy Ridge and its continuation to the north, and action had been taken to comply with these orders.

"The 4th Royal Tanks had not been engaged during the day. The battalion unfortunately had no Mark II tanks of its own, and could only have dealt with enemy infantry attacks on to the Vimy Ridge.

"German aircraft were very active all day, starting at dawn with air reconnaissances, followed by heavy bombing and machine gun attacks on all roads, villages, and located troops. Brigade Headquarters, the Command Post of the field ambulances, and unit rear echelons had casualties from these attacks. During the afternoon, it was decided to move the rear echelons of units and all spare personnel to the north of Lens, and orders were issued for moves to start at dusk.

"About 2300 hrs., General Franklyn sent for the brigade commander and issued verbal orders for an immediate withdrawal to an area northwest of Carvin (southwest of Lille). This was a complete reversal of the decision given during the afternoon, that the whole force would stand and fight on the ground then held.

  
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"Orders were issued to the brigade, and a withdrawal in good order was made during the night on the Nenin Lietard-Carvin route. Fortunately, as night fell, German activity ceased as usual, and no attempts were made to follow up any success gained during daylight."

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M.I.D., W.D.  
Special Bulletin No. 12  
August 29, 1940

FRENCH TANKS AND ARMORED CARS

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SOURCE

The information in this bulletin is based upon a British official summary of French equipment dated July 25, 1940.

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## I. GENERAL NOTES ON DESIGN AND PERFORMANCE OF FRENCH ARMORED VEHICLES.

### A. Purpose.

French tanks appear to have been designed with mass production, thickness of armour, and fire power in mind. As a result, performance, speed, and quality have in some cases been sacrificed. Many French tanks are of the two-man type, and, in spite of the fact that a 37-mm. gun and a light machine gun are mounted, the fighting compartment is very cramped and becomes hot and uncomfortable under battle conditions.

### B. Drive.

No definite teaching has been adopted for forward or rear sprocket drive. Generally speaking, light tanks have front sprocket drive, and medium and heavy tanks rear sprocket drive.

### C. Power Units.

With the exception of Char 1936 F.C.M (Forges et Chantiers de la Mediterranee at La Seyne), these are in all cases gasoline, and in comparison with German armored vehicles, the horsepower per ton is low, ranging between 7 and 10 h.p. per ton. In all cases power units are situated in the rear of the vehicle, and are provided with large air louvres, either on the side of the rear hull or on the top. The French accepted for future designs a minimum weight ratio of 10 h.p. per ton.

### D. Fuel Tanks.


These are situated in the rear of the vehicle, and generally on the right hand side immediately behind the turret. In the case of the Char B there is in addition a tank on the left hand side behind the radiator louvres.

### E. Tracks.

The general design of the tracks appears to be very heavy and wide. Difficulty is experienced because of poor adhesion of the tracks on slopes except in the case of the Char B track and the new Renault track modelled upon it, which are said to be good in soft ground because of the grouser effect.

### F. Suspension.

Coil springs with scissor articulation appear to have been generally favored except for the Char B, where an articulated



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system supported by a composite springing system employing coil and laminated springs and a rubber buffer stop are fitted. In the latter case the center bogie wheels are more heavily loaded to facilitate steering.

Except for the Char B, two and three point suspension systems are used and rather poor absorption is provided. This results in a harsh suspension. Shock absorbers are employed only on the Somua cavalry tank and then on only small capacity tanks. The tendency is to use small steel bogie wheels. On the heavier tanks the suspension is well protected by armored skirting plates.

#### G. Performance.

1. Radius of Action. French tanks have a radius of between 82 and 150 miles, according to the type of tank and conditions of travel.

2. Cross Country. Trench crossings, climbing vertical steps, fording water and the standard of maximum gradient are low on average, with the exception of Char B, which will cross a trench of 9 feet width with firm sides. Fascines have been developed to augment their trench crossing capacity.

#### H. Armament, Mountings and Gun Control.

In all cases the antitank gun mounted in the tank is inferior in performance to the corresponding calibre of French field antitank gun.

In most coaxial mountings the machine gun can be disconnected and used separately with limited free traverse independent of the turret. All mountings employ an external mask to protect the main part of the mounting. Elevation is by shoulder control and traverse by hand gear in the Hotchkiss and Renault tanks and by hand gear or constant speed electric switch on the Somua and Char B. The first variable speed electrical power traverse on the Chaumond Granat principle was ready in February and was being applied to the Somua cavalry tanks; it is inferior to the British power traverse systems.

#### I. Observation Arrangements.

Care was taken to provide plenty of protected means for observation with both periscopes and episcopes. The latter were difficult to judge distance through, although giving a good field of view, and old models suffered from lack of protection against dust and rain. The French were introducing the prism type of look-out, which they had found more effective.

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J. Exits.

A feature of the French tanks is the rear exit door in every turret. Where possible an exit is provided in the hull floor to enable the crew to evacuate the machine if it turned upside down.

K. Intercommunication.

The majority of types of armored vehicles are equipped with radio sets and flag signalling devices.

L. Special Vehicles.

Extensive experiments were being carried out with two types of remote control midget vehicles which were run up to obstacles, concrete or otherwise, and which exploded when stopped, blasting a way through for other vehicles. Certain production orders had been placed.

Experiments were in hand with super-heavy tanks, weighing 120 tons. Two prototypes were being built, but these would not have been ready for proper trial until well into 1941.

II. TYPES OF TANKS USED BY FRANCE.

Serial 1. Name: Renault 35 - AMR (Auto-mitrailleuses, Reconnaissance)  
Type: Light.  
Weight: 4 $\frac{1}{2}$  - 5 tons.  
Crew: Driver and gunner.  
Dimensions: Length, 12'6"; width, 5'3"; height, 6'6"; belly clearance, 1'2".  
Thickest armor plate known: 13-mm.  
Armament: One 13-mm. heavy machine gun; two light machine guns.  
Ammunition carried: 220 rounds for heavy machine gun; 2250 rounds of small arms ammunition.  
Engine: 80 h.p.; 4 cylinders; water cooled.  
Drive: Front sprocket.  
Maximum speed on roads: 31 m.p.h.  
Radius of action: 125 miles.  
Suspension: 4 bogie wheels; 1 bogie; 2 independent bogie wheels, fore and aft.  
Performance: Trench crossing, 4'3"; step, 1'8"; water forded, 1'8", maximum gradient, 40°.  
Intercommunication: Radio; flag; lamp.  
Remarks: 200 were in existence.

(Note: An American source also listed the following types as of April 6, 1940.

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Renault ZB; 4.4 tons; one 7.5-mm. machine gun; limited standard.

Renault FT; 6-7 tons; wartime model; about 2200 on hand.

Renault NC; 7 tons; 1928, a modernized model of the Renault FT.

ZT Model (Renault); 7.2 tons; one 47-mm. cannon and one 7.5-mm. machine gun; experimental for use with cavalry.

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Serial 2. Name: R 35 (Renault)  
Type: Light.  
Weight: 11 tons.

(Note: An American source stated in April, 1940 that the weight of this tank was 11 tons. G-2)

Crew: Driver and gunner.

Dimensions: Length, 13'2"; width, 6'; height, 8'1"; belly clearance, 1'2".

Thickest armor plate known: 40-mm. cast steel.

Armament: One 37-mm. gun; one light machine gun coaxially mounted.

(Note: In April, 1940, an American source stated that the 37-mm. gun might be replaced with a 47-mm. gun. G-2)

Ammunition carried: 100 rounds for gun; 2400 rounds small arms ammunition.

Engine: 83 h.p.; 4 cylinders; water cooled.

Drive: Front sprocket.

Maximum speed on roads: 12 $\frac{1}{2}$  m.p.h.

Radius of action: 90-95 miles.

Suspension: 5 bogie wheels; 2 pairs of bogies with scissor articulation; 1 independent bogie wheel.

Performance: Trench crossing, 5'3"; step, 2'11"; water forded, 2'7"; maximum gradient, 40°.

Intercommunication: Radio and flag.

Remarks: Tank may be fitted with tail to improve trench crossing performance; can be easily produced in large numbers and many were in existence.

Serial 3. Name: H 35 (Hotchkiss)  
Type: Light.  
Weight: 11 $\frac{1}{2}$  tons.

(Note: An American report in April, 1940, listed the weight of this tank as 12 tons. G-2)

Crew: Driver and gunner.

Dimensions: Length, 13'8"; width, 6'1"; height, 7'; belly clearance, 1'3".

Thickest armor plate known: 40-mm. cast steel.

Armament: One 37-mm. gun; one light machine gun coaxially mounted.

(Note: The 37-mm. gun may be replaced by a 47-mm. gun, according to an American report of April, 1940. G-2)

Ammunition: 100 rounds for gun; 2400 rounds small arms ammunition.

Engine: 75 h.p.; 6 cylinders; water cooled.

Drive: Front sprocket.

Maximum speed on roads: 17 m.p.h.

Radius of action: 82 miles.

Suspension: 6 bogie wheels; 3 bogies; scissor articulation.

Performance: Trench crossing, 4'11"; step, 2'7"; water forded, 2'7"; maximum gradient, 40°.

Intercommunication: Flag.

Remarks: Mass production of this tank was easy, and many were in existence. An improved model was in production.

Serial 4. Name: H 39 (Hotchkiss).

Type: Light.

Weight: 12 tons.

(Note: In April, 1940, an American source listed the weight of this tank as approximately 13 tons. G-2)

Crew: Driver and gunner.

Dimensions: Length, 13'8"; width, 6'1"; height, 7'; belly clearance, 1'3".

Thickest armor plate known: 40-mm. cast steel.

Armament: One 37-mm. gun; one light machine gun coaxially mounted.

Ammunition carried: 100 rounds for gun; 2400 rounds small arms ammunition.

Engine: 120 h.p.; 6 cylinders; water cooled.

Drive: Front sprocket.

Maximum speed on roads: 26 m.p.h.

Radius of Action: 130 miles.

Suspension: 6 bogie wheels; 3 bogies, scissor articulation.

Performance: Trench crossing, 4'11"; step, 2'7"; water forded, 2'7"; maximum gradient, 40°.

Intercommunication: Flag.

Remarks: This tank replaced the H. 35 (Serial 3).

(Note: An American source also lists the D type tank (Renault), 13 tons, with armament the same as that of the H 35. There were about 190 of these in existence. G-2)

Serial 5. Name: F.C.M. 1936 (Forges et Chantiers de la Mediterranee at La Seyne).

Type: Light.

Weight: 13 tons.

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(Note: According to an American source, April, 1940, the weight of this tank is 12 tons. G-2)

Crew: Driver and gunner.  
Dimensions: Length, 14'7"; width, 7'; height, 7'2"; belly clearance, 1'3".  
Thickest armor plate known: 40-mm. rolled steel plate.  
Armament: One 37-mm. gun; one light machine gun.  
Ammunition carried: 100 rounds for gun, 2400 rounds small arms ammunition.  
Engine: 100 h.p.; 4 cylinders; Diesel; water cooled.  
Drive: Rear sprocket.  
Maximum speed on roads: 15 m.p.h.  
Radius of action: 200 miles.  
Suspension: 9 bogie wheels; 4 pairs of bogies; 1 independent adjustment bogie wheel; coil springs; suspension completely protected by skirting.  
Performance: Trench crossing, 5'10"; step, 2'11"; water forded, 2'9"; maximum gradient, 40°.  
Intercommunication: Flag.

Remarks: 100 of these tanks were known to exist.

(Note: An American report stated in April, 1940, that production of this tank had been stopped. About 90 were said to be in existence. G-2)

Serial 6. Name: ACGI (Renault).  
Type: Light.  
Weight: 13 tons.  
Crew: Driver; gunner; radio operator.  
Dimensions: Length, 14'9"; width, 6'10"; height, 7'4"; belly clearance, 1'4".  
Thickest armor plate known: 25-mm.  
Armament: One 47-mm. gun; two light machine guns.  
Ammunition carried: 100 rounds for gun.  
Engine: 180 h.p.; 4 cylinders; water cooled.  
Drive: Front sprocket.  
Maximum speed on roads: 20-22 m.p.h.  
Radius of action: 100 miles.  
Suspension: 5 bogie wheels; 2 pairs of bogies with scissor articulation; 1 independent bogie forward.  
Performance: Trench crossing, 6'; step, 2'; water forded, 2'8"; maximum gradient, 40°.  
Intercommunication: Radio and flag.  
Remarks: Only a few of these tanks were in existence.

Serial 7. Name: AMX (Renault).  
Type: Light medium.  
Weight: 16 tons.  
Dimensions: Length, 17'; width, 6'9"; height, 7'4"; belly

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clearance, 1'1".

Armament: One 47-mm. gun; one light machine gun.

Thickest armor plate known: 50-mm.

Armament: One 47-mm. gun; one light machine gun.

Engine: 130-150 h.p.; Diesel.

Drive: Rear sprocket.

Maximum speed on roads: 13 m.p.h.

Radius of action: 90 miles or 8 hours.

Suspension: 16 bogie wheels; 7 bogies; 2 independent bogie wheels, fore and aft; suspension protected by skirting.

Performance: Trench crossing, 7'; water forded, 3'11"; maximum gradient, 40°.

Intercommunication: Radio and flag.

(Note: An American report of April, 1940, lists the AMC tank, R 35 (Renault) 16.5 tons, armed with one 37-mm. cannon and one 7.5-mm. machine gun. There were about 75 of these in existence. G-2)

Serial 8.

Name: S 35 (Somua)

Type: Medium.

Weight: 18 tons.

Crew: Commander; driver; gunner.

Dimensions: Length, 17'6"; width, 6'8"; height, 8'10"; belly clearance, 1'4".

Thickest armor plate known: 40-mm.

Armament: One 47-mm. gun; one light machine gun.

Ammunition carried: 120 rounds for gun; 5000 rounds of small arms ammunition.

Engine: 190 h.p.; V.8; water cooled.

Drive: Rear sprocket.

Maximum speed on roads: 29 m.p.h.

Radius of action: 140 miles.

Suspension: 9 bogie wheels; 4 bogies with leaf springing; 1 independent bogie wheel; suspension protected by skirting.

Performance: Trench crossing, 7'10"; step, 2'11"; water forded, 3'3"; maximum gradient, 40°.

Intercommunication: Radio and flag.

Remarks: A considerable number of these tanks were in existence.

Serial 9.

Name: D 2 (Renault).

Type: Medium.

Weight: 20 tons.

Crew: Commander-gunner; driver; operator-loader.

Dimensions: Length, 16'7"; width, 7'2"; height, 8'9"; belly clearance, 1'4".

Thickest armor plate known: 40-mm.

Armament: One 47-mm. gun; two light machine guns.

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Ammunition: 110 rounds for gun; 5000 rounds of small arms ammunition.  
Engine: 150 h.p.; 6 cylinders; water cooled.  
Drive: Rear sprocket.  
Maximum speed on roads: 14 m.p.h.  
Radius of action: 90-95 miles.  
Suspension: 12 small bogie wheels; 6 bogies with coil springing; suspension protected by skirting.  
Performance: Trench crossing, 7'10"; step, 3'3"; water forded, 3'3"; maximum gradient, 45°.  
Intercommunication: Radio and flag.  
Remarks: A limited number of these vehicles were manufactured.

(Note: An American report indicates that about 210 were in existence as of April 6, 1940. G-2)

Serial 10. Name: S.Au. 40 (Somua).  
Type: Medium.  
Weight: 21½ tons.  
Crew: Commander; driver; gunner ( and loader ?)  
Dimensions: Length, 19'5"; width, 6'11"; height, 8'10"; belly clearance, 1'4".  
Thickest armor plate known: 40-mm.  
Armament: One 75-mm. gun.  
Engine: 190 h.p.; V.8; water cooled.  
Drive: Rear sprocket.  
Maximum speed on roads: 20 m.p.h.  
Radius of action: 140 miles.  
Suspension: Same as Serial 8.  
Performance: Trench crossing, 7'10"; step, 2'11"; water forded, 3'3".  
Intercommunication: Radio and flag.  
Remarks: 32 were in existence; long-barreled 75-mm. gun was mounted in the hull; to be used as armored artillery.

Serial 11. Name: Char B (Renault).  
Type: Heavy.  
Weight: 31 tons.

(Note: An American report, April, 1940, lists the weight as 29-35 tons. G-2)

Crew: Commander-gunner; driver; radio operator; loader-mechanic.  
Dimensions: Length, 20'8"; width, 8'2"; height, 9'; belly clearance, 1'7".  
Thickest armor plate known: 60-mm.  
Armament: One 75-mm. gun; one 47-mm. gun; two light machine guns.  
Ammunition carried: 72 rounds for 75-mm. guns; 70 rounds for 47-mm. guns.

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Engine: 270 h.p; 6 cylinders; water cooled.  
Drive: Rear sprocket.  
Maximum speed on roads: 17 m.p.h.  
Radius of action: 150 miles  
Suspension: 16 small bogie wheels; 3 bogies of 4 wheels with leaf and coil springs; suspension protected by skirting.  
Performance: Trench crossing, 9'; step, 3'10"; water forded, 4'10"; maximum gradient, 40°.  
Intercommunication: Radio; flag; lamp.  
Remarks: Considerable numbers of these tanks were in existence. The armor was to be increased to 75-mm. and the engine to 350 h.p. Renault.

(Note: According to American sources, the B-bis (Renault) is a conventional B tank more heavily armored and equipped with a powerful engine. It weighs about 33.3 tons. There were about 415 B and B-bis tanks in existence as of April 6, 1940. G-2)

Serial 12. Name: Char 2 C.  
Type: Heavy.  
Weight: 68 tons.  
Crew: 12-16 (i.e. commander; 1-2 drivers; 6-10 gunners; 2 loaders; 1 radio operator).  
Dimensions: Length, 34'2"; width, 10'3"; height, 12'6"; belly clearance, 2'.  
Thickest armor plate known: 50-mm.  
Armament: One 155-mm. gun; one 75-mm. gun; four machine guns; four machine guns in reserve.  
Ammunition carried: 150 rounds for guns; 10,000 rounds of small arms ammunition.  
Engine: Two 250 h.p. petrol electric engines.  
Drive: Rear sprocket.  
Maximum speed on roads: 7 m.p.h.  
Radius of action: 50-60 miles.  
Suspension: Completely obscured by skirting.  
Performance: Trench crossing, 16'-17'; step, 5'2"; water forded, 5'; maximum gradient, 45°.  
Intercommunication: Radio and flag.  
Remarks: This tank is obsolete and it is doubted whether it could be used in any role except in close support; it did not exist in large numbers.

(Note: An American report of April 6, 1940, lists a C tank; 70 tons; armed with one 75-mm. cannon and four 7.5-mm. machine guns; experimental type; about 25 in existence. G-2)

### III. TYPES OF ARMORED CARS USED BY FRANCE.

Serial 1. Name: AM.39. (Auto-mitrailleuses, Somua)

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Weight: 6.2 tons.  
Crew: 3.  
Dimensions: Length, 12'4"; width, 6'7"; height, 6'6";  
belly clearance, 1'6".  
Thickest armor plate known: 15-mm.  
Armament: One 25-mm. gun; one light machine gun.  
Number of wheels: 6.  
System of steering: Front wheels only and rear steering  
position.  
Engine: 4 cylinders (?); 75 h.p.; rear engine.  
Drive: Four wheels or six.  
Maximum speed on roads: 40-50 m.p.h.  
Radius of action: 220 miles.  
Intercommunication: Radio.  
Remarks: Latest type of cavalry armored car; very cramped.

Serial 2.

Name: Panhard, AMDTOE  
Weight: 6.7 tons.  
Crew: 4.  
Dimensions: Length, 17'6"; width, 6'7"; height, 8'8".  
Armament: One 37-mm. gun; one light machine gun.  
Number of wheels: 4.  
System of steering: Front 2 wheels.  
Engine: 86 h.p.  
Maximum speed on roads: 48 m.p.h.  
Radius of action: 480 miles.

Serial 3.

Name: Laffly, AMTOE, S15.  
Weight: 7.5 tons.  
Crew: Commander; driver; 2 gunners.  
Thickest armor plate known: 15-mm.  
Armament: One 13-mm. heavy machine gun; one light machine  
gun.  
Number of wheels: 6.  
System of steering: Front wheels only.  
Engine: 60 h.p.; 6 cylinders.  
Drive: All 6 wheels, or 4 may be driven.  
Maximum speed on roads: 37- m.p.h.  
Radius of action: 600 miles.  
Remarks: Made for colonial use.

Serial 4.

Name: Panhard, AMD 1935.  
Weight: 8 tons.  
Crew: Commander; gunner; operator; 2 drivers (1 in rear).  
Dimensions: Length, 15'4"; width, 6'6"; height, 7';  
belly clearance, 1'2".  
Thickest armor plate known: 18-mm.  
Armament: One 25-mm. gun.

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Number of wheels: 4.

System of steering: Front 2 wheels.

Engine: 105 h.p.; 4 cylinders; water cooled; rear engine.

Maximum speed on roads: 50 m.p.h.

Radius of action: 250 miles.

Intercommunication: Radio and flag.

Remarks: Standard armored car; available in large numbers.

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G-2/2657-231

M.I.D., W.D.  
Special Bulletin No. 13  
August 31, 1940

GERMAN CHEMICAL WARFARE AND SMOKE

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SOURCE

These notes are based upon information from a British official publication issued in July, 1940.

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I. GENERAL POLICY.

Although the German government has ratified the international agreement prohibiting the use of gas as a weapon of war, it should be borne in mind that the Germans were instrumental in introducing the gas weapon into warfare. Despite the stress of active war, they independently discovered and tried out during the war 1914-1918 many of the most effective war gases known and at the same time developed an effective if sometimes faulty chemical warfare technique. Our information indicates that since the last war, German research on chemical warfare methods has been pursued unremittingly. Moreover, the German chemical industry is very highly developed. It must be assumed, therefore, that Germany is in a high state of preparedness, both offensively and defensively, for gas warfare and, if the Germans deem it expedient to introduce gas warfare, it will be pursued with their characteristic vigour, ingenuity, and ruthlessness.

The introduction of gas warfare in the form of cloud attacks from cylinders on the Western Front in the last war was, to some extent, a tactical error on the part of Germany, for the prevailing wind was inimical to such operations on over 60 per cent of occasions. Modern chemical warfare methods, however, are much less dependent upon wind limitations. Consequently, it is improbable that this factor will deter them from the use of gas, and in the light of all information available, the indications are that the Germans are in a position to bring the gas weapon into effect as soon as they see fit to do so.

II. GENERAL ORGANIZATION, ADMINISTRATION AND POLICY.

General control and coordination of all German chemical warfare activities are centered in the Waffenamt (Ordnance and Supply Department, Ministry of Defense). It is presumed that this department also directs the policy regarding the offensive use of gas.

The technical side of chemical warfare is controlled by the anti-gas section in the testing branch of the Ordnance Department. Despite its nomenclature, it is probable that research regarding offensive gases is also the concern of this section, and that it cooperates in this work with the various establishments and firms enumerated in Paragraph V of these notes.

III. DEFENSE.

A. Organization, Administration, and Strength.

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Anti-gas training in the army is on a sound and efficient basis; large scale field exercises or gas war games have been reported on a number of occasions. Army anti-gas schools are located in Berlin, Celle and Brelah, and the schools attached to the firms of Auer and Draeger are also extensively used for training of instructors for the army.

It is believed that there is in each battalion or equivalent unit an anti-gas officer assisted by a non-commissioned officer, and in each company an anti-gas N.C.O. These specialists instruct their units in anti-gas measures and carry out periodical inspections of all anti-gas equipment. Each company or equivalent unit has a man detailed as a gas sentry (Gasspurser).

It is stated that in addition to these specialists, decontamination, or anti-gas detachments, exist in all formations.

B. Equipment.

1. Respirators.

a. Since 1934 the gas mask issued to the German armed forces has been of the type known as the S-Mask or Model 30/31, essentially a somewhat rigid facepiece with directly attached (screw-in) drum container, the whole transported in a cylindrical sheet metal carrier.

The facepiece is composed of canvas, rubber, and cotton fabric. The eyepieces are of cellulose acetate, with anti-dimming discs. Inlet and outlet valves are in the container attachment piece, which is screwed to take the neck of the container.

Two types of container were approved and issued for use with the above facepiece, one made by Draeger, the other by Auer (Degea). In general appearance these containers are similar, being grey-painted tinned plate drums.

The general scheme of filling for these two containers is comparable and consists of a wire gauze immediately below the neck of the drum, a finer mesh gauze made up of strands of twisted paper, a layer of brick granules, another twisted paper gauze, a layer of activated nutshell charcoal supported by a third paper gauze, and a perforated metal plate under which the particulate filter is housed. The containers differed in the volumes of the granule and charcoal layers, and in the Auer container the particulate filter consisted of ten discs of beaten cotton fibers arranged concertina fashion, whereas in the Draeger design, the

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filter consisted of a single pad of a mixture of cotton and white asbestos fibers. The granule layer is usually treated just before issue or on mobilization to protect against acid gases.

b. There is another type of respirator, the Degea 89V, which is reported to be made for use in places where heavy concentrations of gas may lie.

Of the German respirators examined since the outbreak of war, the facepieces show no material change, and some of the containers were similar to the two asbestos pad type containers already described. They bore in addition to the more usual markings, the letters "Getr" and a date, from which it may be concluded that the granules have been subjected to final treatment.

In two containers, however, the filling was found to be materially different, as the normal upper layer of impregnated granules was replaced by a layer of extruded type charcoal impregnated with copper and iron, with a cotton wool pad above this layer to prevent charcoal dust being inhaled. The normal layer of nutshell charcoal was also replaced by untreated charcoal, while one of the filters contained blue asbestos instead of white. These two containers afforded protection, possibly incidental, against arseniuretted hydrogen, whereas the previous type did not.

It is probable that this is the true mobilization container. An inscription, "F.E. 37", probably meaning Feld Einsatz, or Field Container 1937, appears on the container.

The navy is stated to have an extension piece providing protection against carbon monoxide, and there are indications that a limited quantity of carbon monoxide masks and also oxygen respirators is available for land forces.

It is understood that a spare container may be carried by troops on active service. As the container is merely screwed into the facepiece, it can be rapidly changed if necessary even in a gas cloud. It is improbable, therefore, that penetration will be achieved except by delivering a massive concentration on the target, and the element of surprise is essential for attack by any but persistent gas.

2. Protective Clothing. Anti-gas suits made of rubberized fabric, either in two pieces—a jacket with hood and trousers—or in one piece—the overall type with a fixed hood for

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the head—are provided for all members of decontamination squads. The material used is rubberized, either on both sides or on one side only. The former type resists liquid mustard gas for 7 hours and the latter for 2½ hours. Apart from the personnel mentioned above, these suits hitherto have been issued only for demonstration and experimental purposes on a scale of one per company or equivalent unit, but recently large issues have been made to many units.

The Germans realize that this anti-gas clothing is cumbersome and can be worn only for limited periods, but they lay much stress on training to accustom men to wearing it for long periods.

Reports now suggest that German troops are provided with a sheet of rubberized fabric, called Gasplan, to protect them from splashes of blister gas (spray) and to be used as an anti-gas pathway incrossing contaminated ground. It measures about 5 feet 4 inches square. There is a hole in the center of the sheet to put the head through, and when worn, it reaches down to the knees.

3. Mobile Laundries. Mobile decontaminating plants for clothing are available in units. These are carried on powerful motor lorries and consist of a water tube boiler for generating steam quickly, a steam chamber, and a drying chamber. Uniforms can be contaminated in these vehicles in 15 minutes.

4. Decontamination Materials. Bleaching powder is the usual substance for ordinary decontamination work. Clothing will be subjected to steam treatment.

5. Anti-Gas Ointment. The Germans are reputed to prefer dry bleach to bleach ointment for personal decontamination, and their troops carry packages of Losantin tablets, a stablized bleach of high chlorine content. Mixed with water or saliva, this is used on the skin to neutralize the effects of mustard gas. Work has, however, been carried out on ointments, and it is believed that a chloramine type has been developed.

6. Gas Detectors. It is stated that German troops are issued with gas detectors in the form of sheets of test paper in an ebonite case. The chemical components of this detector are not known.

7. Collective Protection. Anti-gas curtains will probably be available for the German army, and it is stated

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that the field artillery makes a practice of gas-proofing its gun positions. Gas-proofing of tanks and armored cars has also been mentioned. It is believed that many of the fixed fortifications in Germany are equipped with filtered ventilation.

#### IV. OFFENSE.

##### A. Organization, Administration and Strength.

Germany is apparently convinced of the utility of specialist troops for conducting large scale gas operations. For several years the Germans have been experimenting secretly with different forms of offensive gas units and special smoke units, but no accurate information as to the final form of this organization is available.

1. Special Gas Units. It is believed that the Germans intend eventually to include a gas battalion in each army corps; these battalions are reported to consist of two to four mechanized companies equipped variously with portable contamination apparatus, such as wagons of 400 liters capacity for larger scale contamination, projectors, mortars, mines charged with yellow cross gas, spray apparatus adaptable to gas and smoke, and flame throwers. There are also believed to be a number of independent offensive gas companies, each about 250 strong. The latter are attached temporarily to regiments as and when required, and could, if necessary, be concentrated into larger units. It is at present uncertain whether these companies will in war be formed into the corps gas battalions mentioned above, or whether they will be retained as additional gas troops.

2. Gas in Smoke Units. The equipment of the smoke units described in Paragraph VII. A. is suitable for the dispersion of gas.

3. Gas in Tank Units. It appears certain that a proportion of the tanks in a tank regiment are fitted with apparatus for the emission of gas.

4. Gas in Engineer Battalions. There have been reports of mechanized engineer battalions equipped with offensive gas weapons, including flame throwers and gas sprayers driven by motor pumps. Such units are reported to be fully trained for offensive and defensive gas warfare; they are also reported to carry smoke apparatus for screening bridging operations.

##### B. Contemplated Gases for Offensive Use.

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1. General, All Types: Blister, Choking, Tear and Nose Gases.

In the following paragraphs the main gases likely to be met are listed. Experimental work on a wide variety of other gases has been reported from time to time, and although it is not thought that any important new war gas has been discovered, indications of possible new developments are included in the lists.

Recent information suggests that the Germans are familiar with the potentialities of arseniuretted hydrogen and it has been shown that their new respirator containers afford protection against this gas.

2. Blister Gases. German Classification: "Yellow Cross".

| Common Names  | German Names.                   |
|---|---------------------------------|
| a. Mustard H. S.  | <u>Lost Senfgas; Gelbkreuz.</u> |
| b. Lewisite I.  | Possibly <u>Gelbkreuz II.</u>   |
| c. Dick (Ethyldichloro-arsine)  | <u>Dick; Grunkreuz III.</u>     |
| d. Vesicant Toxic Smoke (Combination of blue and yellow cross gases). |                                 |

Notes.

a. Mixtures of mustard gas and lewisite may be used in cold weather to reduce the freezing point.

b. It is not thought that Germany regards lewisite alone very favorably, but reserve stocks are reported to exist.

c. The mustard gas is likely to be an improvement on the 1914-1918 German mustard. It is more persistent, possibly more vesicant, and more difficult to decontaminate.

d. It should be noted that as a result of exposure to the fumes from some German explosives, respiratory and skin effects have been noticed. These are of such a nature that they might easily be confused with the results of exposure to blister gases.

3. Choking Gases. German Classification: "Green Cross".

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Common Names.

German Names.

- |                                |   |
|--------------------------------|---|
| a. Phosgene: C.G.              | <u>D. Stoff: Grunkreuz.</u>                   |
| b. Diphosgene                  | <u>K. Stoff: Perstoff Grunkreuz I and II.</u> |
| c. Chloropicrin: P.S.          | <u>Klop.</u>                                  |
| d. Dick (Ethyldichloro-arsine) | <u>Dick: Grunkreuz III.</u>                   |
| e. Chlorine.                   |   |

Note. There have been frequent references to mixtures of choking gases such as phosgene, diphosgene and chloropicrin.

4. Nose Gases (Toxic Smokes). German Classification:  
"Blue Cross."

Common Names

German Names.

- |   |                              |
|---|------------------------------|
| a. D. A.  | <u>Clark I: Blaukreuz.</u>   |
| b. D. C.  | <u>Clark II: Cyan Clark.</u> |
| c. D. M.  | <u>D. M. Adamsite.</u>       |
| d. Vesicant Toxic Smoke (Combination of blue and yellow cross gases). |                              |

Note. Germany shows a preference for D. A. and D. C. D. M. was not used in the war 1914-18.

5. Tear Gases. German Classification--Usually T-Stoff.

Common Names.

German Names.

- |                   |                 |
|-------------------|-----------------|
| a. C. A. P.       |                 |
| b. B. B. C.       |                 |
| c. Bromoacetone   | <u>B-Stoff</u>  |
| d. Benzyl Bromide | <u>T-Stoff.</u> |
| e. Xylol Bromide  | <u>T-Stoff.</u> |

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f. Bromomethyl Ethyl Ketones. Green T. (Has also choking gas effect).

Note. C. A. P. and B. B. C. were not used by the Germans during the last war, who make little mention of tear gases. The inference is that they attach little importance to tear gases per se, but the possible presence of lethal gases camouflaged by weak tear gas should not be overlooked.

6. Miscellaneous.

| Names.  | Remarks.  |
|---|---|
| a. HCN (Hydrogen Cyanide)   | Not used by the Germans in the last war.                |
| b. Arseniuretted Hydrogen:<br>Arsine (Not related to toxic smokes). |   |
| c. Carbon Monoxide (and mettalic carbonyls)                         |   |
| d. Organic Antimony Compounds                                       | Toxic smoke in which antimony replace the arsenic atom. |
| e. Camouflage or Fake Gases (Methyl telluride and derivatives).     | Used for tactical purposes and economy.                 |

C. Offensive Weapons and Equipment.

1. General. As has already been stated, research in chemical warfare methods has been almost continuous in Germany since the last war. The marked attention given to aerial and ground methods of contamination may be taken as an indication that the Germans regard these as being more efficient and economical than artillery shell for the dispersion of gas. The possible development of some ingenious new gas weapon cannot therefore be ignored.

Since the last war the Germans have studied the influence of meteorological factors and topography on the tactical use of gas and smoke. It may be anticipated that conditions from the offensive and defensive aspects suitable and unsuitable for the use of gas have been approximately but clearly defined and an accurate estimate made of the value of the different types of weapons.

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2. Aerial Spray. Considerable work has been carried out on aerial spray. The Germans undoubtedly regard low altitude spray (below 1,000 feet) as an effective weapon both against personnel and for ground contamination, and a number of trials have been carried out in which as many as six aircraft have been employed together or in relays. They are rather significantly silent as to the possibilities of high altitude spraying; and although such evidence as is available suggests that its use is unlikely, it is not certain that the true position has been disclosed. Information as to designs of spray apparatus is meagre and of little value, as so many factors have a material influence on results. The charging will probably be mustard gas, but lewisite and mixtures of mustard gas and lewisite have also been mentioned.

3. Chemical Aircraft Bombs. Marked attention has been given by Germany to aircraft gas bombs. Types of bombs which have been mentioned are:

- a. 10 kg. bombs with H. E./toxic smoke effect.
- b. 50 kg. mustard gas bombs with highly sensitive impact fuse; small burster for ground contamination or larger burster for antipersonnel effect, giving an area of contamination about 20 meters radius from point of burst.
- c. 250 kg. mustard gas bombs with time fuze, to function at about 100 meters above the ground and contaminate an area of about 5,000 square meters. Plain glass bombs and glass capsules, charged mustard gas.

4. Projectors. No reference has been made to any efforts to increase the range or improve the mobility of this weapon, which forms part of the equipment of the special gas units.

5. Artillery Shell. The limitations of gas shell for artillery are clearly realized. Nevertheless, reports suggest that Germany has for some time been building up extensive stocks of gas charged shell, and the evidence is rather against any development of a base ejection design of shell, but this point is by no means certain.

The Germans mainly favor the 10.5 cm. (4.14 in.) and 15.0 cm. (5.9 in.) calibers with chargings of choking gas using small bursters and blister gas using a larger burster to scatter the liquid over a considerable area. The area of contamination is given as about 50 square meters for the 10.5 cm. and 100 square meters for the larger caliber. A highly sensitive percussion fuze will be used to minimize crater formation and consequent loss

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of charging in the soil.

Another type which they used during the last war and which they still regard as highly effective is their "Blue Cross" shell, in which a fragile container of glass filled with D. A. or D. C. is embedded in an H. E. charging. The shells have considerable H. E. effect, and the detonation is supposed to disperse the D. A. as a toxic smoke cloud. During the last war, however, our experience was that the toxic smoke effect was nearly always trifling.

6. Mortars. Mortars for the dispersal of gas and smoke are included in the equipment of the chemical troops. The 8.1 cm. (3.16 in.) mortar could, if necessary, fire a projectile containing gas, but no details are available of special designs of mortar gas projectiles.

7. Gas Grenades. Experiments have been carried out with these weapons, but no details are available. Gas grenades having twice the capacity of the last war designs are stated to be available in Germany.

8. Gas Cylinders. Although little is said about these, Germany is certainly familiar with the possibilities of the beam cylinder method of attack, and small portable cylinders have been mentioned in connection with chemical troops; also knapsack sprayers of persistent and possibly non-persistent gas.

9. Gas Mines. The Germans used a variety of designs of large caliber mortar bombs, or Minenwerfer during the last war. These could be adapted to gas chargings and might be used as contamination mines. Reference has also been made to large gas containers sunk at the sides of roads. These are actuated by a time mechanism upon passage of vehicles or fired electrically. Gas mines are also mentioned in relation to frontier fortification and on tidal beaches to harass landing parties.

10. Bulk Contamination. Tanks, armored cars, and lorries are stated to be equipped with apparatus for spraying gas and smokes. Chemical lorries are included in the equipment for the special gas units. Portable sprayers are also envisaged.

11. Toxic Generators. No evidence has been obtained that the Germans possess an official design of thermal toxic generator, but generators made by a private firm, Stoltzenberg, containing D. A., D. C., and diphenylarsinic acid have been found to be very effective, although their storage properties were not good.

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V. RESEARCH AND RESEARCH ESTABLISHMENTS.

Scientific aspects of chemical warfare are dealt with at the Technical High School at Charlottenburg. Research is also carried out at the Kaiser Wilhelm Institute in Berlin, in several state laboratories, and in the laboratories of the German Dye Combine (the I. G.), the Auer Company, and the Continental Rubber Company. A large field experimental station is situated in the Brelow-Munster district (Luneberger Heide), around Lake Muritz in East Prussia, and in an area near the Tyrolese border. There are probably others at Wunsdorf and List.

VI. MANUFACTURING ESTABLISHMENTS AND DEPOTS.

A. Gas.

There is little doubt that the German chemical industry could meet large demands for war chemicals. During the last war Germany manufactured nearly 50,000 tons of actual war gases, and it has been suggested that capacity is now far in excess of this.

B. Respirators.

The total number of firms at present engaged on the manufacture of either respirators or components is about twelve; of these the Auer and Draeger Companies are the most important.

VII. SMOKE.

A. Smoke Units (Nebelabteilungen).

1. General. The Germans attach great importance to the use of smoke units, formerly a part of the artillery but now constituted as a separate arm of the service. They are controlled by the Inspectorate of Smoke Troops and Gas Defense (Inspektion der Nebeltruppen und fur Gasabwehr) in the General Army Branch in the Department of the Commander-in-Chief of the Army. These units are fully mechanized. Six have been identified.

It is possible that each corps will eventually include a smoke unit, but up to the present, so far as is known, only a few of these units have been formed. They could, if necessary, be used as gas troops, as the weapon with which they are equipped could be employed to fire a gas projectile.

2. Organization. Each smoke unit consists of headquarters, signal section, and three smoke companies each of two

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sections, each provided with four mortars. One company is equipped with material for decontaminating gassed areas.

3. Strength. Little information is available. It is believed that the strength of a smoke company is about 120 all ranks, and that it has approximately 24 vehicles (four cars for commanders, twelve lorries for personnel and eight lorries for weapons and equipment).

4. Armament. Each smoke unit has 24 and each company eight 8.1 cm. (3.16 in.) mortars. It is possible that a 10 cm. (3.93 in.) mortar may be introduced.

#### B. Equipment.

Information is lacking as to actual smoke materials used, but it is reasonably certain that the Germans possess:

1. Generators or smoke pots, probably with Berger type mixtures.
2. Generators of the C. S. A.-lime type.
3. Spray-type smoke apparatus probably using C. S. A. or oilum.

Preference seems to be given to spray apparatus of the C. S. A. type for land forces. The C. S. A.-lime generator was developed during the last war.

#### C. Smoke Units and Apparatus in Other Arms of the Service.


1. Artillery. It is believed that the Germans consider the dispersion of smoke by artillery weapons uneconomical, as the latter are thereby prevented from carrying out their primary function. Smoke shell is, however, still carried in artillery units.

2. Tank Units. It is believed that a proportion of the tanks in each tank regiment and other armored vehicles are provided with smoke-producing apparatus.

3. Engineer Units. It is probable that engineer units are or will be equipped with smoke-producing apparatus to cover working parties engaged in bridging and similar operations and can use it for screening special sites such as railheads.

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4. Aircraft. It is reasonably certain the Germans possess smoke curtain apparatus for use by aircraft using titanium tetrachloride. German aircraft also lay smoke screens, as distinct from vertical curtains, in conjunction with land forces.

D. Other Special Smoke Units (Einnebelungsabteilungen).

Special smoke units exist, but their organization is not known. It is probable that they come under the Air Ministry and form part of the air defense organization of the country. They are, it is believed, responsible for protection of stations, bridges, industrial areas, etc., against air attack, and for such protection they use smoke screens. They are said to be equipped with small generators and large smoke spray apparatus.

VIII. INCENDIARY.

1. Bombs. The Germans have a very high opinion of the offensive value of incendiary bombs, particularly as a means of attack on rear areas and civilian centers. The bombs principally considered are of the electron type, containing a thermite charging in a casing of metallic magnesium, of 2, 5 and 10 kilos., and would be released from aircraft in large numbers against suitable targets. There is a tendency in foreign practice to insert a small explosive charge in the larger type of incendiary bombs to prevent interference with them during the burning period.

2. Flame Throwers. Little is known regarding types of flame throwers in use, and it is possible that no definite decision regarding these weapons has yet been reached.

The Germans developed and used during the last war two types:

a. A portable type carried on the soldier's back. This was capable of projecting a jet of flame about 20 yards for a period of about one minute.

b. A cumbersome semi-stationary type consisting of several cylindrical tanks of oil, which could be used in relays together with suitable cylinders of compressed nitrogen to provide the pressure, and connecting pipe systems, the whole weighing several tons and capable of projecting a jet of flame about 40 to 50 yards.

Germany has continued to experiment with these weapons and it is stated that she possesses both portable and semi-stationary types comparable with the above, with somewhat increased

  
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range.

In addition, a larger type mounted on tanks or armored vehicles, or mounted permanently in concrete emplacements has been developed as an antitank weapon. The mobile types must, however, be highly vulnerable, because of the large quantity of inflammable oil they carry. The range is given variously as 45 to 120 meters, but this is probably an exaggeration.

The latest information is of 2-ton flame thrower wagons, each carrying a heavy machine gun and a flame thrower coupled to the engine of the vehicle, with a range of about 200 yards.

#### IX. BACTERIA.

Methods of bacteriological warfare have been thoroughly investigated by scientific experts and courses on this subject are held from time to time in Berlin. The students at these courses, which, it is believed, last for six weeks, are advanced gas specialists.

Experiments on the spraying of "foot and mouth" disease, dispersal of anthrax spore, pollution of water supplies and destruction of crops by means of germs dropped from the air, have been specifically mentioned. Some of these are directed by the Agricultural High School at Bonn.

It is maintained that the whole investigation is being undertaken from the defensive point of view, as Germany is in possession of authoritative information that preparations for bacteriological warfare are at present being made in Russia.



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G-2/2657-231

M.I.D., W.D.  
Special Bulletin No. 14.  
September 6, 1940

CAPTURED GERMAN REGULATIONS ON RECOGNITION  
AND COMMUNICATION BETWEEN GROUND AND AIR

NOTICE

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SOURCE

The German documents reprinted here were captured by Allied troops in May, 1940. It is believed that they regulated the matter of mutual recognition signals between ground and air for the entire German Army.

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BETWEEN TROOP UNITS OF THE ARMY AND FLYING  
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I. REGULATIONS FOR THE IDENTIFICATION SERVICE BETWEEN TROOP  
UNITS OF THE ARMY AND FLYING FORMATIONS OF THE AIR ARM.

The Commander-in-Chief of the Army  
General Staff of Army / Training Detachment (Ia)<sup>1.</sup>  
No. 450/403

Headquarters German Army, March 8, 1940.

The prerequisite for close and successful cooperation between troop units of the army and flying formations of the air arm is quick and unimpeachable recognition between these units and formations. Superiority of the German air arm over that of the enemy makes it possible for the army to identify itself as German by clearly visible identification signals from the ground. It can do this in combat, in the position of readiness and on the march.

The following directives for the identification service come into force immediately. They are to be made common property of troops without delay. Provisions in conflict with these directives are abrogated.

A. General

1. Cooperation is to be thoroughly set down and regulated in advance for each case by the proper commanding authorities<sup>2.</sup> of the army and air arm. These commanding authorities are, moreover, responsible for keeping each other constantly informed as to land and air movements which take place in the same field of operations.

2. Commanders of all grades are responsible for scrupulous observance of the provisions in each situation. Violations and negligence are inimical to full success, and they endanger friendly troops.

B. Army

1. Swastika flags are for all troops in each situation the main sign of identification. Depending upon requirements, they are to be laid out on the ground, waved, or spread out on vehicles. On armored cars they should be fastened so as to be clearly visible to airmen.

- 
1. The German Ia is the equivalent of the American G-2.
  2. Underlines are the same as those in the original German orders.

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2. Swastika flags will be displayed constantly in the zone of identification and in such manner that friendly troop units are made known without fail, precluding any confusion from the air.

The zone of identification shall be determined, provided higher commands of the army groups do not adopt a uniform standard, by army commands acting with competent commanding authorities of the air arm. It embraces that part of the friendly region of combat and movement within which there is question as to whether the air arm will be employed against ground targets. The rearward limit of this zone will be a selected and prescribed line which is easily and unequivocally determinable for air and ground troops, such as a river course, railway, or road. The forward limit lies at the enemy.

The more difficult it is for the air arm to recognize movements on the ground, the deeper in general will be the zone of identification. Whether the zone can be prescribed for a fairly long period of time or whether it must be regulated anew at short intervals depends upon the rapidity with which the ground situation develops.

3. Temporarily the troop unit makes itself known outside the zone of identification as follows:

- a. Upon request by signal of the airmen.
- b. Of its own accord, as soon as the airmen are recognized as friendly.
- c. At the order of a commander, from company commander up, in order to prevent being fired upon by friendly airmen.

4. Yellow panels and white rectangles<sup>1</sup> on the stern armor of all armored vehicles are additional marks of identification. The yellow panels are to be employed when swastika flags are lacking.

5. At night, all troop units on the march and in the position of readiness identify themselves as friendly at the request of airmen, provided the position makes this possible without incurring danger, by flashing with white light. These intermittent signs will be given with all available light sources, including pocket lamps, blinking lamps, and lights of motor vehicles.

1. When brought into use in snow, the white rectangle is replaced by a dark rectangle on the whitened stern armor.

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6. The order for displaying and withdrawing visual signals is given in each case by the competent commander, from company commander up.

C. Air Arm

1. Determination of the mark of nationality is the surest means of distinguishing between friendly and hostile airplanes. Knowledge of German airplane models facilitates the identification. Good training and constant alertness of air scouts are prerequisite for quick and unimpeachable identification of friendly airplanes.

In higher altitudes, recognition of airplane models and nationality marks is facilitated by friendly airplanes. In case the air situation permits, these planes fly in slightly zigzag fashion and slowly turn around the longitudinal axis, or "wobble".

2. The Very pistol signal is an additional mark of identification for single airplanes and flying formations. It is fired off generally by night, and by day only when necessary. This luminous signal is prescribed for a determinate length of time.

3. The distinguishing formation (Kennungsformation) facilitates identification of aircraft units. Prescribed for a determinate length of time, it may appear in the following forms: (a) line; (b) column; (c) echelon left; (d) echelon right.

The hostile pursuit may make it impossible to adopt the distinguishing formation. Thus, in the proximity of the front, a formation which is not flying in this manner can not be regarded forthwith as hostile.

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II. REGULATIONS FOR THE SIGNAL COMMUNICATION SERVICE BETWEEN TROOP  
UNITS OF THE ARMY AND FLYING FORMATIONS OF THE AIR ARM.

The Commander-in-Chief of the Army  
Army General Staff / Training Detachment (Ia)  
No. 750/40 g

A. General

The signal communication service (Verstandigungsdienst) transmits messages, reports, and requests between ground troops and airplanes or flying formations. In this connection, visual signals are the means of communication employed by the army, while luminous signals and dropped messages are employed by the air arm.

B. Army

1. Visual signals of the army are:

Small panels, white or red;

Large panels, white, yellow, or red;<sup>1.</sup>

White tracer bullets;

Improvised means of all sorts.

2. Visual signals are employed as follows:

a. To Make Known the Most Forward Line Attained, for the Combat Air Reconnaissance. The following means are used:

(1) Small panels: These are appropriately laid out in groups of three or four (close together, side by side, and parallel to the front) when their meaning is "We hold the line". In order to obviate errors, they will be displayed only by rifle companies of the front (line?)—not by battalion and higher echelons.

(2) White Luminous Signals: The signals are fired into the earth, especially into shell holes, before the front line. Since they easily disclose forward friendly troops to the enemy

1. Large white panels are to be replaced in the future, as delivery permits, by large yellow panels.

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and make it more difficult to give airmen the exact location, they are to be employed only when the marking of the front line by other signals is not possible.

(3) Improvised Means: When (1) and (2) cannot be used, the most forward units can make their identity known to deep-flying friendly airmen by waving handkerchiefs, maps, helmets, and the like.

b. To Designate Combat Posts:

Combat posts are made known by means of panels, in accordance with Section 6, H. Dv. 425 (Army Signal Tables). For this purpose the large panels are to be laid out in such manner that the signs are readable toward the front.

c. To Designate Combat Messages:

Combat messages are designated by means of large panels in accordance with Section 6 (Panels), the H. Dv. 425 (Army Signal Tables). Panels are laid out in addition to the identification signs of the corresponding headquarters.

Furthermore, visual signals may be employed by troops through laying out small panels as follows:

(1) The front line uses such signals for the purpose of designating the direction in which hostile nests of resistance lie, when support is requested against these nests. The sign is a large "T". 1.

The large vertical line or beam of the "T" is laid pointing towards the hostile nest of resistance. The small horizontal line or beam is laid on that end of the vertical line which is turned toward the target.

(2) Headquarters use visual signals for the purpose of designating the approximate direction in which hostile artillery positions lie when the combatting of such artillery is requested. The sign is a "T" with double horizontal line (  $\overline{\text{T}}$  ). It is laid out in accordance with the preceding paragraph.

3. Displaying of Visual Signals is either prescribed by agreement with the air arm for a definite time requested by airmen, or carried out independently by troop units. The order for displaying

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1. To eliminate confusion, the signal "Fuel needed", which is similar, will be laid out with the large yellow panels.

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and withdrawing visual signals is given in each case by the competent commander, from company commander up.

C. Air Arm

1. The Airman's Means of Communication to the Ground Are:

- a. White tracer bullets, which mean, "Ground troops are requested to make themselves known by visual signals."
- b. Green tracer bullets, which mean, "Observer wishes to drop (a message?). Lay out the message-dropping cross, or make known by any other signs where the dropping can be effected."
- c. Red dropped smoke signals or red tracer bullets, which mean, "Attention! Hostile antitank defenses, antitank guns, artillery or barriers ahead."
- d. Blue or violet dropped smoke signals, <sup>1</sup>•which mean, "Attention! Hostile tanks."

- 
1. Until blue and violet dropped smoke signals have been made ready, the reconnaissance squadrons, particularly those for tank reconnaissance, are advised to improvise them from hand smoke-signals formed in bundles.

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III. MEANING OF LUMINOUS SIGNALS.

Secret. Not to be let fall into enemy hands.

To 22d Division,  
By order No. 150/40 3.K.

| Serial No. | Color        | Warning   | Signal                       | Meaning   |
|------------|--------------|-----------|------------------------------|---|
| 1          | <u>white</u> | white     | Luminous signal              | <u>Here we are</u>                                      |
| 2          | white        |           | Parachute tracer bullet      | <u>Here we are</u>                                      |
| 3          | white        |           | Star-cluster cartridge       | (Warning signal for Nos. 1 & 2)                         |
| 4          | <u>red</u>   | red       | Single star signal cartridge | <u>Enemy attacking</u>                                  |
| 5          | red          |           | Star-cluster                 | (Warning signal for No. 4)                              |
| 6          | red          |           | Hand smoke signal            | <u>Not passable for armored cars; barrier for tanks</u> |
| 7          | red          |           | (obliterated)                |   |
| 8          | <u>green</u> | pale rose | Single star signal cartridge | <u>We attack; displace artillery fire forward</u>       |
| 9          | green        |           | Star-cluster                 | (Warning signal for No. 8)                              |
| 10         | green        |           | Hand smoke signal            | <u>Passable for tanks</u>                               |

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| Serial No. | Color              | Warning | Signal   | Meaning   |
|------------|--------------------|---------|--|---|
| 11         | <u>violet</u>      |         | Smoke cluster cartridge or smoke chain cartridge   | <u>Tank warning</u>   |
| 12         | violet             |         | Hand smoke signal  |   |
| 13         | violet             |         | Parachute smoke cartridge  | (Warning signal for No. 11)   |
| 14         | <u>blue</u>        |         | Smoke cluster cartridge or smoke chain cartridge   | <u>Tank warning</u>   |
| 15         | blue               |         | Hand smoke signal  |   |
| 16         | blue               |         | Parachute smoke cartridge  | (Warning signal for No. 14)   |
| 17         | white<br><br>white |         | Tracer bullets fired from airplane<br><br>Answer at the ground:<br>Firing of tracer bullets, laying out of panels, or displaying of swastika flags at level of company combat posts. | <u>Ground troops requested to make themselves known by visual signals</u>   |
| 18         | green              |         | Tracer bullets fired from airplane   | <u>Observer wants to drop a message; Display message-dropping cross or make known by other means where dropping can be effected</u> |

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| Serial No. | Color | Warning                   | Signal   | Meaning  |
|------------|-------|---------------------------|--|--|
| 19         | red   |                           | Tracer bullets fired or smoke signals dropped from airplanes | <u>Attention! Hostile antitank defense, antitank guns, artillery, barriers</u> |
| 20         | red   | Twice in quick succession | Dropped smoke signals  | <u>Attention! Hostile armored cars</u>   |
| 21         | ---   | ---                       | ---  | Airplane identification signal, specially announced from time to time          |

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M. I. D., W. D.  
Special Bulletin No. 15  
September 23, 1940.

RHINE CROSSING AND PENETRATION OF THE MAGINOT LINE  
(THE GERMAN COLMAR OPERATION, JUNE 15-16, 1940)

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SOURCES

The information contained in this bulletin was furnished by official American sources.

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NOTE

Two explanatory maps are attached.

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I. THE COLMAR SECTION OF THE MAGINOT LINE AND THE GENERAL STRATEGICAL SITUATION, JUNE 15, 1940.

The German Rhine crossing on both sides of Breisach on June 15, 1940, and the subsequent penetration of the Maginot Line in Alsace by the German Seventh Army, constitutes one of the most daring and interesting tactical operations of the German West offensive of 1940.

The French Maginot Line was reputed, prior to this offensive, to be the strongest fortified line of the world. The Colmar section, however, was by no means its strongest portion, at least insofar as size of forts and number of pillboxes were concerned. Great reliance had been placed by the French General Staff on the major obstacle which the Rhine River afforded. The Rhine is here a truly formidable obstacle--between 200 and 300 yards wide, with a current which varies between six and eight miles per hour. With this natural obstacle interposing itself between France and Germany, no such fortress line was thought necessary in Alsace as was constructed farther north in the Moselle and Saar frontier sections.

The German attack on the Colmar section of the Maginot Line was launched at a time when the military strength of France was no longer intact. The French Army had already suffered severe defeats along the Meuse, in Flanders, and before Paris. The French divisions in Alsace had been stripped to a minimum to provide reserves for General Weygand's armies, which were fighting with their backs to the wall along the Somme and Aisne Rivers.

Whether the Germans ever would have selected the Colmar section for an attack if the French armies had been as strong in Alsace in June as they had been in April may well be doubted. Nevertheless, the French Army in Alsace was still formidable in the middle of June, at least numerically. The fortress troops of the Maginot Line had not been drawn on to reinforce Weygand. A fair number of active divisions also remained in Alsace-Lorraine ready to reinforce the fortress units should they be attacked. However, the morale of the French armies was, by June 15, no longer satisfactory. Paris had fallen to the Germans on the previous day, and such a catastrophe cannot but have left an imprint on French esprit. Subsequent events proved that the morale of the fortress troops had been undermined by nine months of war inactivity. As a French commander of one of the Maginot forts said after the armistice, "We fortress troops never trained throughout the winter. We had lost the feeling of being soldiers and had become mere mechanics. Offensive spirit and skill had totally vanished. We were prisoners of our forts." This statement of a French officer appears, in view of the events about to be described, as a correct estimate of the morale of his troops.

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It explains the overwhelming and rapid success of the German Seventh Army in breaking through, in two days, what was reputed to be the strongest fortress line in the world.

The Maginot Line to the east of Colmar was, in every sense of the word, a "line" rather than a zone. The permanent works extended back from the river line to a depth of not more than 10,000 yards, whereas the depth of the fortified zone on the German side of the river varied between 25,000 and 30,000 yards. The Maginot fortifications were in three lines. The forward, or outpost, line lay directly on the river bank and consisted of a string of concrete pillboxes spaced at intervals of from 200 to 600 yards. All pillboxes were located within 100 yards of the river. These positions had been selected to give the pillboxes both a field of observation and fire to the front and flanks. Rearward defense had not always been provided. These fort units covered the Rhine River with a continuous band of fire and were mutually supporting. Every favorable river crossing was covered by the fire of two or more pillboxes. Between the pillboxes were located armored cupolas which had no armement but which strengthened the chain of observation along the river. The following sketch shows the plan of a typical French bunker of this river line.

The steel cupola was about 8 feet high and 6 feet in diameter and was set in concrete. The thickness of the steel varied from 2 inches at the bottom to 12 inches on the exposed upper portion. The cupola had four firing ports. The concrete was heavily reinforced and about 4 feet thick. The normal armament consisted of machine guns, but an antitank gun could be used to replace them very quickly by means of an overhead trolley.

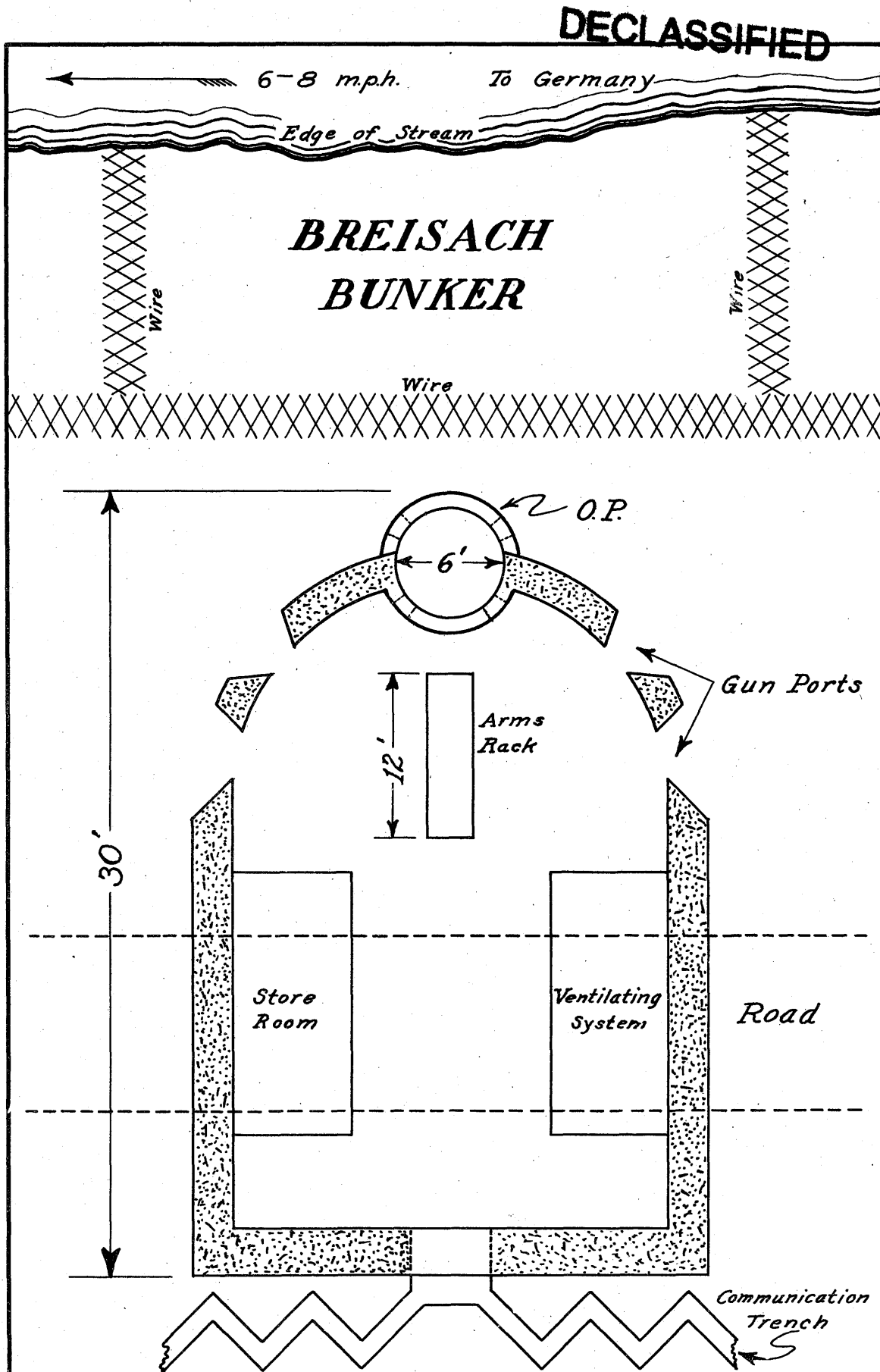
The pillboxes had a weak joint between cupola and concrete. American observers who inspected examples of this type of fortification said it appeared inferior in layout and construction to comparable German works. In particular, the exposed vertical face of the pillboxes toward the river offered an excellent target for the German artillery.

In front of this river line of pillboxes bands of wire entanglement extended toward the river bank, but never into the water. A certain amount of free space lay between the actual river bank and the forward edge of the entanglements. This was a mistake as was later proved in the course of the German attack, since it enabled the Germans quickly to gain a foothold on the French side of the river. Improvised and crude land mines also had been laid within the area of wire entanglements. The French garrison, however, forgot to pull the safety pins of the mines, so that these failed to explode when the attack came.

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Sketch "A" to accompany Special Bulletin No 15 MID Sept. 23, 1940.

Drawn by St. Sgt. H.M. Caldwell - Draftsman M.L.D. 62 War Dept.

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The French second pillbox line ran parallel to the river defenses about two to three miles west of the river. This line covered the town of Neu-Breisach. The third and final defense position lay on high ground to the west of the Rhine-Rhone Canal. The pillboxes of all three lines were very similar. They provided good observation and fields of fire for the garrison. There were, however, no large forts in this section, such as we are accustomed to associate with the idea of the Maginot Line.

The garrison of this forward river line was not strong, and the French had provided no units for local counterattack. Somewhere in the rear areas, and to the west of Colmar, was the French VII Corps as a general reserve for the French fortified line in Alsace. This corps, however, came into action only when penetration of the Maginot Line had been completed and the German troops had advanced to the foothills of the Vosges Mountains. The Rhine front in Alsace was within the section of the French Fifth Army. Its commander, on June 15, is believed to have been General Barnet.

## II. THE GERMAN PLAN

By June 9 the advance of the German right wing armies toward Rouen on the lower Seine and Paris had achieved such important tactical successes that a situation had been created permitting the launching of the main German blow, long planned for the Champagne-Aisne area. French reserves had already been sucked westward. It is believed that seven divisions of the Alsace-Lorraine armies were, on June 10, en route to reinforce the threatened French left wing and center. This transfer naturally weakened the French right wing in Alsace and Lorraine.

The main German blow was to be delivered by "Army Group A" consisting of the Second, Twelfth, and Sixteenth Armies, the center army group of the German armies of the West. This army group, under the command of General-Colonel von Runstedt, attacked at dawn June 9. After breaking through the French forward positions along the Aisne, the army planned to pursue the French armies with armored and motorized forces as far as the Swiss frontier and cut off the right wing of the French armies holding Alsace-Lorraine.

This German attack was highly successful. After hard fighting—in the German opinion the hardest of the war—a clear-cut penetration was achieved on June 10 in the south of the town of Chateau Porcien on the Aisne, and by June 12 armored units pressing through the gap had reached Chalons-Sur Marne. Organized French resistance in front of these armored units vanished quickly. The XIX Corps (Armored) of General Guderian and the XXII Corps (Armored) of General Baron von Kleist began their headlong dash

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southward, which was finally to reach the Swiss frontier at Pontarlier on June 17. This movement, as it progressed southward across the rear of the Maginot Line, was bound to present danger to the encircling force unless the three French armies in Alsace-Lorraine could be pinned down frontally. Frontal pressure against the Maginot Line seemed to the Germans necessary if the encircling force were to carry out its mission successfully. Hence, in accordance with German offensive custom, it was decided to attempt to break through the Maginot defenses at selected points and thereby prevent the French field forces from throwing their weight against the encircling forces who were threatening their rear.

These planned penetrations of the Maginot Line were not haphazard affairs conceived on the spur of the moment. Preparation had been begun as early as November, 1939. Extensive reconnaissance, air and ground, had picked out weak points in the Maginot Line which seemed to offer favorable prospects of success. Two areas were finally selected: a 10-mile stretch of the main Maginot Line, due south of Saarbrücken between St. Avold and Saargemund, and another in the Neu-Breisach section of the Alsatian-Rhine front, a little northeast of Colmar.

The eastern portion of the German West Front, that fronting the Maginot Line, was held by "Army Group C" under the command of General Ritter von Leeb. It consisted of two armies: the First Army, commanded by Generaloberst von Witzleben, and the Seventh Army, commanded by General Dollman. The First Army was assigned to carry out the Saarbrücken attack, while the Seventh was to carry out the attack toward Colmar, the operation being considered in this study.

The Seventh Army comprised between ten and twelve divisions and held that portion of the Rhine front extending from Strassburg to Freiburg. It was composed of three corps, the XXV to the north, and the XXVII in the center, and the XXIII Corps to the south. The latter two corps were assigned the initial task of forcing Rhine crossings and storming the Maginot Line.

The XXVII Corps was commanded by Lieut. General von Zorn. It comprised two divisions which have been identified: the 218th under Major General von Cratz, and the 221st under Major General von Pflugbeil. There was probably an unidentified division in corps reserve.

These two divisions were to attack abreast, the 218th on the north flank of the corps on both sides of Sasbach in the direction of the Alsatian village of Markolsheim, the 221st to force a crossing at Burkheim, and thence to attack southwestward

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toward Colmar.

The XXIII Corps, to the left of the XXVII, was also to attack, forcing a crossing at the German town of Breisach and thence driving southwestward toward Gebweiler. Whether the XXV Corps also participated in the action is not known.

The entire army consisted of units formed since the outbreak of war and classified as Landwehr. The divisions of the XXVII Corps had been recruited in Hessian districts of the IX Corps Area.

The local terrain favored the German attack. The Alsatian side of the stream was flat and largely without cover. The German side was hilly and wooded. Seven miles to the northeast of Breisach rose a wooded hill mass, known as the Kaiserstuhl, to an elevation of some 1400 feet above the river. Spurs 400 feet high extended directly to the river. This Kaiserstuhl hill mass gave the Germans not only superb observation over the Maginot Line, but excellent cover for the mass of artillery which had been drawn together to support the attack.

Another advantageous terrain feature for the Germans was the numerous branch channels on their side of the Rhine. These furnished the attackers safe cover behind which they could assemble in advance their ponton equipment without danger of such material being observed by the French.

The initial tactical problem facing the Seventh Army was a difficult one. Not only must a swift, 200-yard river be crossed, but the French permanent fortifications on the west bank had to be destroyed or neutralized before bridging operations could be begun.

Speed in crossing the Rhine was necessary for the leading elements. Old-type pontoons and German rubber rafts appeared to lack the speed which the Germans felt was necessary if such a daring enterprise were to succeed. To cope with this lack the Germans had developed a type of "motor assault boat", probably with just such a Rhine crossing in mind.

The German motorized assault boat is made of plywood. It is deeper and somewhat larger and heavier than the American assault boat. The latter, designed for propulsion by man-power, is flat bottomed whereas the German boat, designed for propulsion by motor, has a rounded, keeled hull. The capacity of the German boat is about 12 men with arms, and equipment. The motor is of the outboard type. It has 4 cylinders and probably develops at least 40 h.p. The propeller is mounted at the end of a shaft

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about 5 feet long. The entire motor is hinged over the rear gun-whale of the boat. By manipulation of the motor the propeller is kept free of the bottom, and the boat is steered. The most important characteristic of the boat, of course, is its great speed. Thus, it is indicated that the time required for a passage across the Rhine at Breisach was only about 25 seconds.

The other special problem confronting the Seventh Army was the neutralization of the French pillboxes along the Rhine. During the World War both sides had sought to reduce permanent fortification by high-angle fire from howitzers of large calibre. This procedure had sometimes been successful, but quite as often had failed. In the post-war period the science of fortification had developed along a course which made forts all but impregnable to high-angle fire. World War practice, therefore, no longer was practicable for the Seventh Army; hence, some other procedure had to be found for reducing forts and pillboxes. This was believed to have been discovered in the direct fire of the modern anti-aircraft gun at short ranges, and, to a lesser extent, in the similar fire of antitank guns, both supplemented by the close-in operations of the assault Engineers. The high velocity and accuracy of both of these weapons permitted fire to be directed at the armored cupolas and embrasures of the forts. Furthermore, the penetrating and explosive effect of the special shells which Germany appears to have developed prior to the outbreak of hostilities had already proven very effective at Liege and Sedan. Altogether, this specially developed technique for reducing fortifications encouraged the German high command to believe that so long as a fortress line was not held by a field army capable of counterattack it could be speedily reduced.

The exact German plan of attack for the Breisach-Colmar river crossing is not known in detail at this time. American observers, however, had opportunity to inspect the terrain some three weeks after the operation and to listen to lectures held on the ground by German officers who had participated in the fighting. The impressions gained by our officers, together with German statements, permit a fairly accurate, though necessarily incomplete account of the operations.

It should be emphasized that this Alsace attack did not resemble the actions in northern France and Flanders with respect to the prominent role played by the air force and mechanized units. The Rhine crossing of June 15 bears more resemblance to a World War battle than it does to the battles in May and June in Belgium and northern France. The Infantry-Artillery team played the same important role in Alsace as on the Somme in 1916. In June, 1940, however, two further branches of the army made important contributions to the German effort--the Engineers and the Antiaircraft

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Artillery. The role played by the Engineers, or, as the Germans call them, the "Pioneers," deserves special mention.

Recent campaigns have demonstrated time and time again the German conception of the Engineer: The Pioneers are the path-blazers who, working in the very van and in intimate coordination with Artillery and Infantry, overcome obstacles of all descriptions. The success of the entire operation may very well depend upon the success of this obstacle-clearance work of the Engineer. In German doctrine the pontons and explosives of the Engineer are tools of the combat team, in the same sense as are the guns of the Artillery battery. The Engineer himself is a full-fledged member of the team.

The crossing at Breisach and the subsequent establishment of the bridgehead there affords an especially good example of the high importance of Engineers in the combat team. During the assault crossing the Engineers did more than ferry the Infantry to the far bank. The first of the assault boats appear to have been loaded with Engineers whose mission was to assault and complete the reduction of the fortifications along the enemy bank. This example of the Engineer's place in the combat team is especially good because the obstacles concerned were especially formidable: a river 200 yards wide, backed up by a line of permanent fortifications.

It is also known that a small number of dive bombers supported the army in this operation. A few bomb craters were actually observed by our officers in passing through the French fortified zone. Nevertheless, German officers did not stress their role; by implication they suggested that the weather was so bad on the day in question that the original plan to use them en masse had had to be abandoned.

The mass of German heavy artillery assembled to support the Rhine crossing amounted to sixty medium and heavy batteries, besides the normal artillery of the attacking divisions. This mass of artillery was emplaced in position in the hill mass of Kaiserstuhl, from which it could support both the crossings at Breisach and Sasbach.

### III. THE ATTACK—JUNE 15-16, 1940.

The American military observers inspecting the battlefield visited both of the points at which the Rhine crossings were forced. It is probable, however, that still other crossings to the north of Sasbach were forced. The German front of attack was approximately 17 miles wide. Three divisions and one extra Infan-

[REDACTED]

try regiment carried out the initial crossings. Two of these divisions, the 218th and the 221st, belonging to the XXVII Corps, attacked north of the Kaiserstuhl, while an unknown division of the XXXIII Corps forced a crossing south of the Kaiserstuhl between Neu-Breisach and Breisach.

A high German officer made the following statement with regard to the most southerly crossing at Breisach:

"The Rhine at this point was crossed by one Infantry regiment and one Pioneer regiment, supported by anti-tank and antiaircraft guns employing direct fire against French bunkers on and near the river bank.

"We employed sixty batteries of heavy artillery to protect the Breisach crossing. These batteries were located in the vicinity of Kaiserstuhl.

"The initial crossing at Breisach was made with speed boats (Blitzboote) and inflated boats (Schlauchboote) in the face of enemy fire and across the strong Rhine current of about 6 to 8 miles per hour. A small bridgehead was established, and construction on the ponton bridge was started at once by the Pioneers. The French artillery fire was so accurate, however, that the ponton bridge could not be completed until June 18, three days after the attack jumped off."

It appears that the weather constituted an important contributory factor in the success of the operation. The night preceding the crossing was dark and stormy. This made it possible for artillery to be emplaced, and ponton equipage to be assembled in forward areas without detection by the French. The mist and rain on the morning of the attack no doubt contributed to the French failure to detect the assembled equipage and helped the Germans to attain complete surprise.

The American observers also had the opportunity to inspect at close range one of the French pillboxes on the river bank opposite Breisach. This was a typical example of the pillboxes previously described. It had been put out of action by sixty rounds from an 88mm. antiaircraft battery, fired at a range of 400 yards. This battery had been brought into position during the night of June 14-15. Fire had been opened during the last phase of the artillery preparation, and just prior to the crossing by the leading wave of Pioneer troops in assault boats. Direct fire at portholes and turrets had been employed. This particular fortification had been completely destroyed.

There was evidence that practically every shell had hit the target. The concrete face of the pillbox had been reduced to gravel, and it seemed to our observers that the concrete used in its construction had been of inferior quality.

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The American military observers also inspected the terrain at Sasbach. Here a high German officer stated:

"The four French pillboxes protecting the crossing here were all destroyed by the fire of our antiaircraft artillery. Just as at Breisach, we possessed here the advantage of better observation from the hills on the German side of the river. The French on the opposite bank were at a grave disadvantage in having no elevated observation posts from which to observe our preparations.

"Our boats were assembled during the night between the base of the cliff and the river bank. They were so well concealed that the French did not discover them.

"The first storm troops moved forward into position at 10 a.m. June 15. At this same hour all of our artillery opened up for 20 minutes. Immediately after this preparation, our Pioneer troops moved across the river in their speed boats, powered by light motors. They were covered by machine gun fire from the cliffs above us.

"The French artillery was too late in getting started. It opened up at 11:30 a.m., but by that time the attack had progressed so far that a 16-ton bridge could be built. Our bridgehead at this time was 3 km. deep in the enemy territory. The French continued their artillery fire until 6:00 p.m., but they were not able to break up the movement.

"French bunkers were spaced every 200 yards along the bank of the Rhine. One bunker was completely destroyed in one terrible blast. Apparently one of the explosive charges placed by our Pioneers caused an explosion in the French ammunition supply. The French are careless in the way they handle ammunition. This explosion threw debris across the river.

"The Rhine has a current of 6 to 8 miles per hour. At Sasbach it is 200 yards wide. It is the most difficult river for which German Pioneers have had to prepare. Crossing the Rhine in the face of modern concrete and steel fortification, such as the Maginot Line, was not considered possible by the French without a long artillery and air preparation and heavy troop concentrations. We were thus able to effect a perfect surprise because:

- A. We attacked at 10:00 a.m. instead of at dawn, when the French expect attack to take place.

- B. We attacked in the rain. The French expected such an attack to be made only in good weather.
- C. Our artillery preparation was short but intense and effective.
- D. We attacked at Sasbach with a regiment instead of an army.

"The degree of surprise is illustrated in the fact that many of the French prisoners did not have time to put on their shoes before their bunkers were in our hands. These prisoners stated they had gone back to their bunks for a morning nap, feeling certain that June 15 was just another quiet day on the front.

"Three additional factors operated in our favor:

- A. The French river line was not held in strength, nor had the French provided troops for local counterattacks.
- B. The French barbed wire entanglements did not extend to the water's edge. This allowed our landing forces to gain a quick foothold on the French bank. To be effective, these barbed wire obstacles should have extended a considerable distance into the water.
- C. The safety pins on the French land mines had not been pulled. This was probably due to lack of time resulting from the rapidity of the German advance."

Later, in examining the French fortifications in this area, American officers observed pillboxes showing evidence that both anti-tank guns and flame throwers had been used in their capture.

A German Engineer officer, commenting on an operation of a nature similar to this one at Colmar, made the following comments on French resistance:

"Some of the French concrete was excellent, but a great deal of it was rotten, showing graft on the part of the contractor.

"French earthworks frequently were very dangerous to us. We usually reduced them by artillery fire.

"We had lots of antitank guns and used them.

"The French attempted two counterattacks. They used plenty of men, but their leadership was not good, and their timing was bad.

"A Polish division with Polish officers in this area fought exceptionally hard, but Polish prisoners told us they were not satisfied with their leadership.

"Neither the Poles nor the French had any speed in reaction. This was their principal defect.

"Some fought well in defense but seemed unable to take the offensive. The offensive is necessary even in defense."

A German general also made the following comments with regard to the policy of passive defense adopted by the garrison of the Maginot Line:

"Another cause of failure of the Maginot Line was that its defenders were trained only for the defensive. Their fortress troops had no training for anything except the defense of their bunkers and this from the inside. Bunkers cannot be defended without counterattack troops trained in the offensive. France considered the Maginot Line entirely defensive in character. A fortified zone is always for the purpose of aiding the offensive. France immobilized a large part of her forces by training these men only for service in the Maginot Line. These troops could never be used effectively outside of the Maginot Line. Our leaders knew that these fortress troops would never be capable of an offensive either against the West Wall or against our troops operating in Belgium and France, so they were safe in taking practically all of our troops out of the West Wall for use in the field armies. All of our troops are trained in the offensive. Duty in the West Wall is incidental, and in no way requires additional or special training. We found French officers and troops who had served in the same bunkers for three years!

"French bunkers were constructed with concrete 1-1/2 to 3-1/2 meters thick. They were built up on the surface of the ground--not sunk, as German bunkers are. The steel turrets were set on top of the concrete box--not built into it as are ours--and therefore they were easily blown off. The French did have some good ideas for motors, radio, and

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artillery, but their whole conception of warfare was wrong. They lacked vision, leadership, and purpose."

#### IV. COMMENT

The German Rhine crossing at Breisach of June 15 and 16 appears to have been a well planned and skillfully executed operation. However, this German attack met full success largely as the result of the weakening of the French field forces in Alsace which, in turn, was due to disasters in other theaters of war. Also, the lowered morale of the French fortress troops in the Breisach section contributed to the ease of the German victory. Had the French morale been high at this time and had the French reserves in this section still been intact, it is doubtful that the German attack would ever have been launched, or that this attack, if attempted, could have been successful. The timing of the Breisach attack was perfect. It was launched at a moment when the attention of the French reserves in Alsace had been diverted to the columns of German mechanized units moving against their rear from the direction of Rheims and Sedan. Units of fortress troops alone seemed to have been manning the Breisach section of the Maginot Line. French reserves capable of launching even local counterattacks seem to have been lacking. Therefore, this crossing was a contest between a fortress line with its normal garrison only, and an attacking army.

The speed and completeness of the German success suggest that lines of forts, however strong and however well garrisoned, cannot by themselves check the onslaught of an army. Fortress lines appear to possess value only if held by field forces capable of launching both local and general counterattacks. The Breisach section was, perhaps, the weakest section of the whole Maginot Line. Nevertheless, the reduction of this section forced the evacuation of the very strong sections farther north. Hence, it would seem that even a Maginot Line is no stronger than its weakest link.

The German attack procedure is of special interest, because tanks and airplanes were not in evidence. No tanks whatsoever were used, and only a very small number of dive bombers.

The Infantry-Artillery team starred at Breisach in 1940 as it had in the World War. This team, however, received important support from two other arms, the Engineers and the Antiaircraft Artillery.

The "Engineer-Antiaircraft team" appears to have become a specialist for reducing fortifications. This development is one

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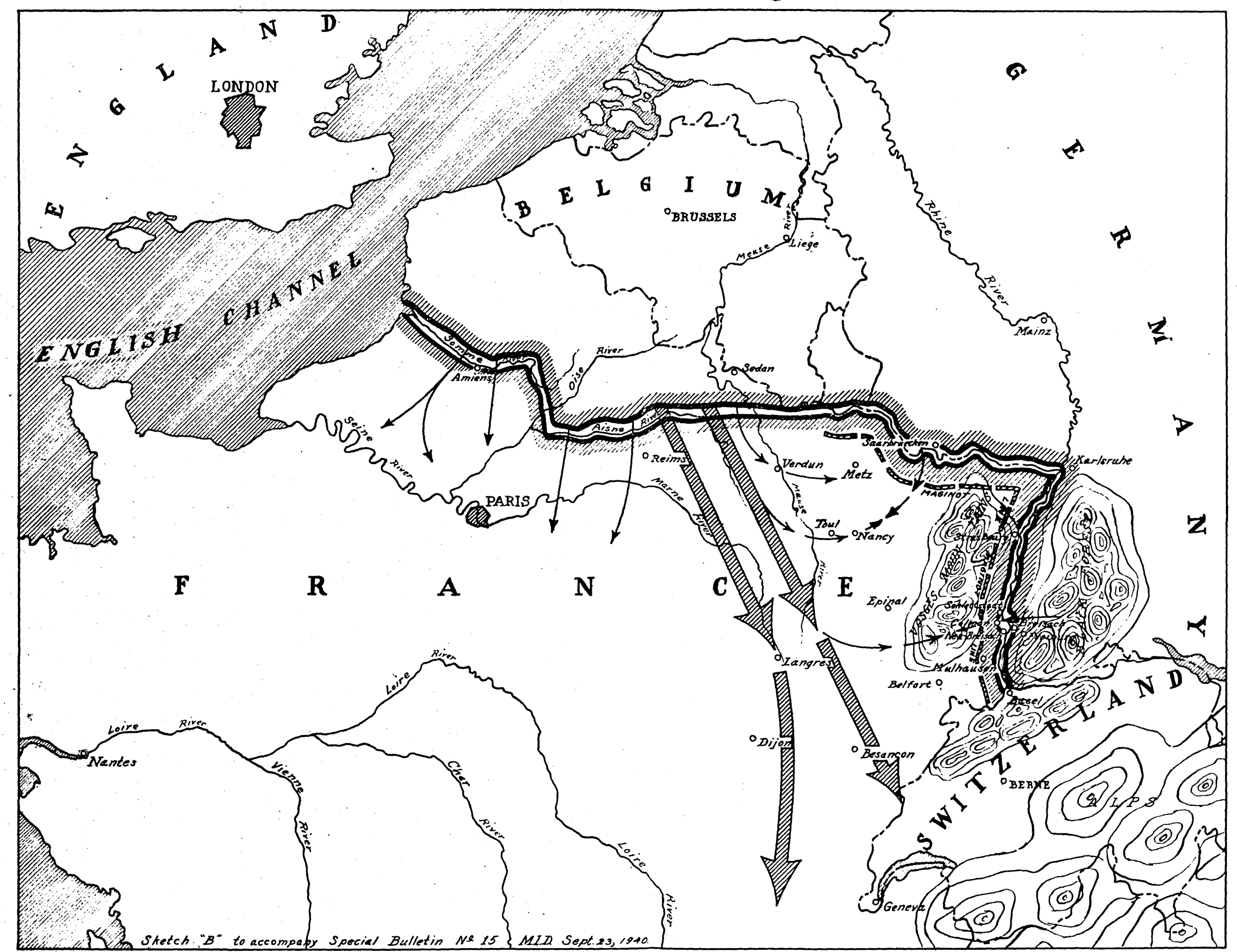
of the most interesting tactical novelties of this Second World War. The successes secured by this team at Liege, Namur, Sedan, and at various points along the Maginot Line are a certain indication that offensive weapons have now reversed the superiority which defensive weapons maintained throughout the World War.

Perhaps the most significant lesson, however, which we can learn from this action is that wars cannot be won by fortresses and fortress troops. Indeed, a fortress line and an army trained for, and carrying out, a defensive strategy present a psychological menace which can be compensated for only by intensive training in the offensive and cultivation of the offensive spirit. This the French army failed to do. It would seem that something of the passive attributes of steel and concrete of the Maginot Line had entered between 1924 and 1940 into the soul of the French Army. The offensive will and spirit conquered at Breisach and at Saarbrücken over the art of fortifications. It is a lesson all armies should take to heart.

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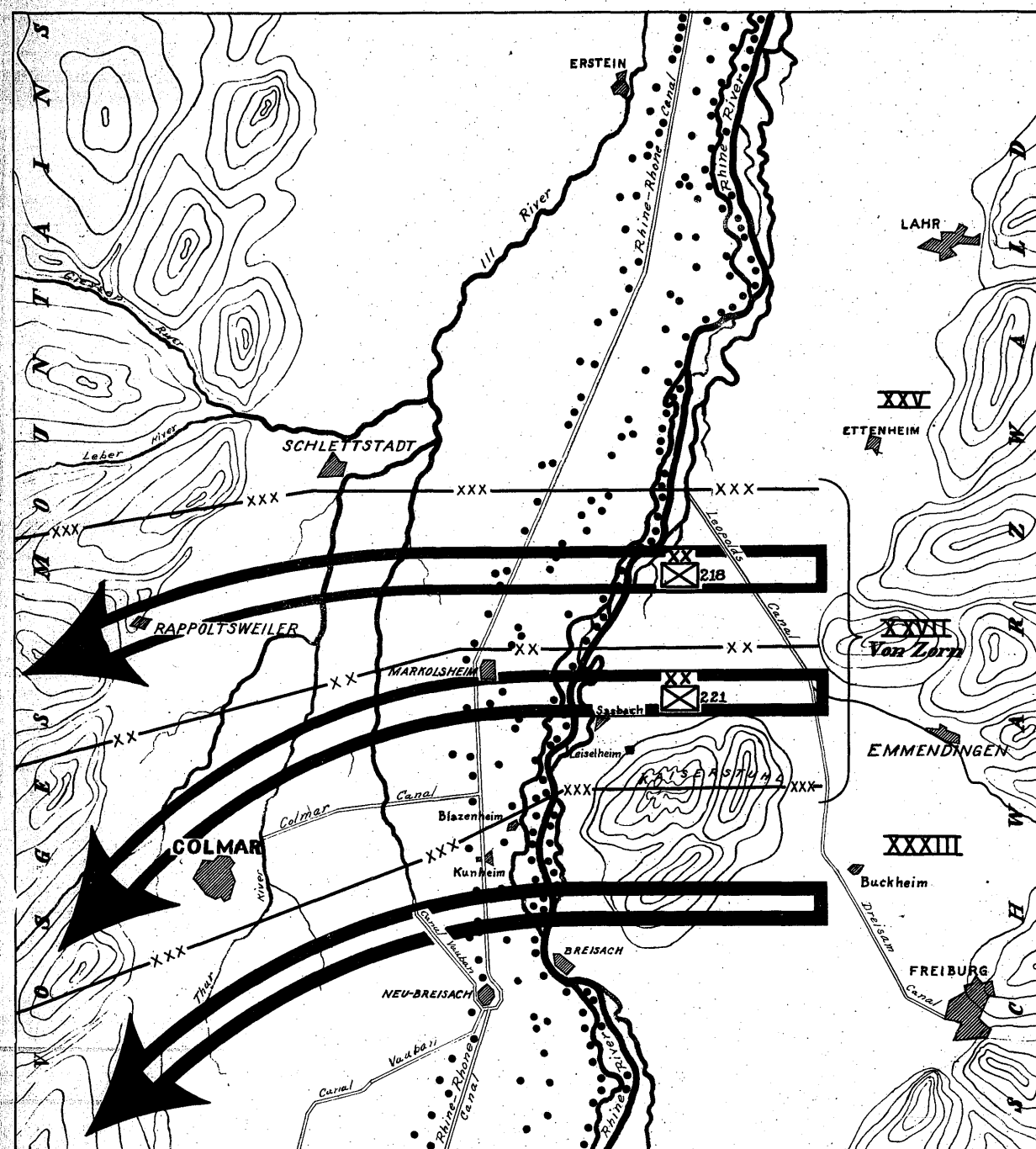
Sketch "B" to accompany Special Bulletin No 15 MID Sept. 23, 1940.  
Drawn by St. Sgt. H.M. Caldwell - Draftsman - MID 6-2 War Dept.

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**THE ATTACK OF THE GERMAN  
SEVENTH ARMY AT COLMAR  
JUNE 15 - 16, 1940.**

Sketch "C" to accompany Special Bulletin No. 15. MID. Sept. 23, 1940.  
Drawn by 2d Lt. H.A. Caldwell - Draftsman MID. 6-2 War Dept.

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SPECIAL BULLETIN

No. 16

G-2/2657-231

MILITARY INTELLIGENCE DIVISION,

WAR DEPARTMENT,

Washington, September 24, 1940.

NOTICE

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FORMS OF FIFTH COLUMN ACTIVITY

SOURCE

This bulletin has been prepared upon a basis of information from a number of official American sources.

CONTENTS

1. INTRODUCTION
2. FORMS OF ACTIVITY BEFORE REVOLUTION OR HOSTILITIES
3. FORMS OF ACTIVITY UPON THE OUTBREAK OF HOSTILITIES

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## 1. INTRODUCTION

Fifth Column activities are certain activities which take place within a given nation although instigated abroad. They are designed to weaken the nation's military strength and its moral and political structure before and during an overturn of its government by force or by military operations directed against the nation by a foreign power. These activities fall naturally into two general phases--operations prior to the outbreak of revolution or hostilities, and armed assistance after the beginning of revolution or hostilities.

Both foreigners and citizens of the country to be penetrated are employed in the creation of a Fifth Column. All human frailties are exploited in the process. Individuals are flattered, persuaded, bribed, threatened, blackmailed, or subjected to economic pressure as circumstances dictate.

## 2. FORMS OF ACTIVITY BEFORE REVOLUTION OR HOSTILITIES

### a. Political Parties

Openly organized political parties are a somewhat unsatisfactory medium for activity of the type under consideration. There are, however, a number of such parties now functioning. Before invasion of the Netherlands by Germany, the Dutch Nazi party, National Socialistische Beweging, openly espoused the cause of national socialism in Holland and was extremely helpful in assisting the Germans to prepare for the conquest of the nation. Other examples may be found in South America. The Integralista party in Brazil is a Brazilian Nazi party ready to seize any opportunity to overthrow the present government with European connivance and align Brazil with Germany. The Vanguardia Popular Socialista party in Chile is also built along Nazi lines. Still another example is the Herrerista party of Uruguay, which is backed by the Nazi element in that country.

As the Communist party has been outlawed in most foreign countries, the Comintern has adopted the effective policy of working through "Popular Fronts". Communists have been ordered to infiltrate into other political parties in order to destroy them from within. No country in Europe other than the U.S.S.R. is known to have a legal Communist party. Formerly the party was fairly strong in northern Norway and Sweden, but it has recently been repressed. There is a small Communist party in Mexico. In Chile the party is openly organized as an element of the "Popular Front" government, and there is also an organization in Uruguay, although it is very weak. As far as is known, all Communist parties are under the direct control of Moscow.

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b. "Front" Organizations of Political Parties

The Comintern has been able to establish "Popular Front" governments in several countries, notably in Chile and in France, where the best example was the Blum government. In accomplishing this object, the party often works through specially created local organizations, not avowedly Communistic, but nevertheless controlled by the Communist party.

Another example of a "Front" organization with Nazi leanings is the Accion Nacional of Uruguay. This society is reported to be in close touch with the Integralistas in Brazil and with the Chilean National Socialist movement.

c. Cultural Societies

Effective penetration can frequently be obtained through the medium of organizations whose members generally are innocent of any subversive purpose. They are organized for the legitimate and honest purpose of promoting cultural development between two countries to their mutual cultural advantage, usually in fields of literature, art, and music. Many of these societies have existed for a long time and have enjoyed a wide reputation for professional international cultural exchange. Control is subsequently gained through political maneuvering within the society itself, and the organization may then be used to further the eventual overthrow of the existing regime. Examples of such societies are the German-Peruvian Cultural Institute of Peru and the German-Argentine Cultural Associations in the various provinces of the Argentine. Efforts are being made now by the Soviet to establish a similar society in Finland. Such a society is likely to be suppressed, and this action would give the U.S.S.R. a casus belli.

d. Press, Radio, and Theatre

The foreign language press is an obvious medium for influencing the thought of alien minorities, but its very obviousness probably keeps it from being as effective as the subsidized or controlled national press. Germany maintains the Transocean News Service, which furnishes free copy to the Latin American press. Many newspapers in Latin America have been purchased outright by German capital or placed under other forms of subsidy. La Razon and El Pampero of Buenos Aires are examples, as are El Universo of Guayaquil, Ecuador, and Trodajo of Santiago, Chile. Where control of the entire paper is not practicable for any reason, one page of it may be bought. It is not uncommon in some South American countries to find one page of a paper devoted to German propaganda stories and another to those published by the Allies.

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The Comintern has been fairly successful in the use of this medium. It has published, among many others, the Daily Worker in London, L'Humanite in Paris, Nordlands Arbeiderblad in Norway, and El Frente Popular in Chile.

Foreign language radio broadcasts have been even more effective in preparing the ground work for eventual military operations. Germany, France, England, Italy, and the U.S.S.R. broadcast constantly in many foreign languages. Very entertaining programs are interspersed from time to time, with particular national versions of news. The Italian broadcasts in Arabic from the Bari station have been especially effective in stirring up the Arabs against Great Britain and have often been the cause of British diplomatic protest. Some of the short wave broadcasts from Berlin and Rome in Spanish find outlets throughout Latin America, either directly from high-powered European stations or by rebroadcast from the station Belgrano in Argentina. The U.S.S.R. even broadcasts in Esperanto. The broadcasts are usually crude and mendacious, but they owe whatever success they may have to repetition.

Both motion pictures and the legitimate theatre have been employed for the propaganda purposes. Films of the German successes in Poland and elsewhere are shown to selected audiences throughout Latin America. Soviet plays and motion pictures, most of which are pure propaganda, were often shown in other countries before the war. They painted a rosy picture of life in the U.S.S.R. but probably had little effect abroad. The really excellent Soviet theatre and ballet occasionally send some of their artists abroad.

e. Diplomatic and Consular Representatives and Military and Economic Missions

There seems to be no uniform practice in use of diplomatic and other legally accredited representatives for preparation from within for foreign invasion. Use of these representatives is, of course, the crudest way of carrying out such activities. It seems to have been the general practice of the Soviet to make use of them, and the results have not been good, for they have frequently been detected.

Germany and Italy certainly utilize their official representatives in weak or unimportant countries. It is known that Italy made use of these representatives in preparation for her occupation of Ethiopia and that Germany did the same thing in Norway and Holland. The secretary of the German embassy in Argentina is thought to be the Nazi leader for Argentina and Uruguay. The Italian police mission in Peru and the German instructors and members of the Italian military mission in Bolivia are thought to be engaging in subversive activity.

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Within stronger nations, the Axis powers are much more circumspect about using their official representatives. Intimidation of the government is likely, for detection is easy. Whenever it is possible for representations to further Fifth Column activities--for example, through use of codes, diplomatic pouches, and transfer of funds--they undoubtedly do so. In addition, they are most active in talking with leading nationals and in emphasizing the views and ideologies of their respective governments.

f. Banking and Commercial Organizations

It is difficult to follow ramifications of the influence of international banking and commercial firms. This influence, which is very considerable, is one of the most usual ways of promoting Fifth Column activity. The Soviet, for example, has long used the tourist agency, Intourist, and the government commercial organization Antorg, as a means of collecting and forwarding information. The Germans have used their shipping firms for the same purpose, and, according to reports, they have also used the Bayer Aspirin Company in South America. The company employs a large number of travelling salesmen who are organized as couriers for the transmission of information. It has been found that a number of American firms with South American branches employ Germans for important executive positions in these branches.

g. Exploitation of Racial and Religious Problems

The existence of racial and religious minorities, especially in Europe, has offered opportunity for stirring up intense feeling against existing governments. Germany has made a practice of organizing all Germans and persons of German extraction throughout the world, regardless of nationality, with a view to using them when the occasion warrants. German minorities in Poland were openly rioting before the Nazi invasion. Italy has appealed to the Arabs with offers of protection against the reputed injustices of British rule, and this appeal has been genuinely effective in stirring up trouble in Palestine. It may be expected to have still further effect throughout the Near and Middle East. Russia has cleverly used "oppressed" races for espionage and sabotage and has given encouragement to pro-Slav movements abroad, especially in the Balkans.

h. Infiltration into Positions of Influence in Governments

The American Consul General in Amsterdam states that the Dutch Army was literally sold out according to a carefully pre-arranged plan involving high ranking military men and civilian officials, including members of the Dutch Nazi party, many of whom were of the old Dutch aristocracy. For example, it is suspected that the supreme commander of the armed forces was removed for the sole pur-



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pose of making way for someone known to have strong Nazi leanings and connections. The same situation is said to have existed in Norway, where prominent officers of the army, strongly pro-German in sympathy, gave active assistance to the Germans before and during invasion.

The Soviets have also had some success in introducing their own people into government positions in foreign countries, especially in the Baltic states. Communist sympathizers and members of the Communist party have succeeded in obtaining positions of importance in "Popular Front" and "Liberal" governments.

i. Infiltration into Educational Systems

German influence in the educational systems of foreign countries has usually been through German language schools and through German educators, especially in the sciences. There are German language schools throughout South America.

The Soviet, using a number of different forms, has been much more active and successful in this type of operation. It has controlled the subject matter of textbooks prescribed for public schools, has organized teachers in elementary schools, and, to a lesser extent, has organized members of staffs and faculties of colleges and universities for the purpose of implanting Communist ideas and of gaining support of Communist doctrine.

j. Subornation of Government Officials and Members of Armed Forces

Actual examples of the subornation of officials are not numerous. Many reports indicate strongly, however, that German invasion of Norway, Belgium, and Holland was facilitated through treason on the part of nationals of those countries. Similarly, the Soviet resorted to this type of activity in the Balkan states and in Poland. The best known instance was that of Major Peter Demkowski, assistant chief of the communications section, IV Bureau, Polish General Staff. After being accused of turning over to the Soviet military attache the secret mobilization plans of the Polish Army, he was convicted by court martial and executed. In many countries of Europe and South America, the prestige of the German army is so great that it has commanded marked admiration on the part of army officers of those countries. This admiration has been carefully fostered in some cases by permanent or temporary German military missions. While there may be no treason immediately involved, this feeling towards the German army prepares the ground for possible later subornation of officials.

k. Aliens and Nationals of Alien Extraction

Nationals of the Axis powers are not permitted to travel

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or reside abroad unless they have been carefully investigated and approved by party authorities. While in residence outside their own country, they are controlled by enrollment in the party organization abroad, by issuance of short-term passports only, by direct control of the amount of money they are permitted to take out of the country, by indirect control of their property within the country, and by threat of reprisals against their families and friends. Some of the countries in the Axis or under its control consider citizenship a matter of birth rather than of residence and do not recognize citizenship obtained in foreign countries by their nationals. They continue to exercise very strict control over citizens of other countries who are of their national extraction in much the same manner as they control their own nationals residing abroad.

1. Crews of Ships and Aircraft

Crews of German ships in foreign ports are always a source of potential danger. In Norway, they actively assisted invasion. The crew of the scuttled German battleship, Graf Spee, which is now interned in the Argentine, is reported to be giving a great deal of trouble to the Argentine government. Before the outbreak of war members of the crews of German ships and airlines were used as couriers for collecting and transmitting military information to Germany. Crews of commercial airliners are also used for active reconnaissance over their routes. German airlines are now operating in Brazil, Ecuador, Bolivia, and Peru, and it is expected that transatlantic service via Dakar will soon be re-established.

m. Refugees

One of the most dangerous elements in Fifth Column activity is the refugee. Before the German invasion, Holland was full of German Jews, each a potential Fifth Columnist. Many of these had been sent in by the German government to pose as refugees; others took part in Fifth Column activities either because they were Germans first and Jews second, although not in sympathy with the existing government, or because they feared that German reprisals against their families or their property in Germany would result from their failure to take orders from Nazi agents in Holland.

Many of the countries of Latin America have the same problem to face today, and it may be expected that the German government will take full advantage of the refugee situation to introduce German agents--Jews, or Aryans passing as Jews--and to control by threat of reprisal the bona fide refugees. Thus, any refugee from Germany, Jewish or Aryan, must be suspected as a German agent. This is particularly true if he has relatives re-

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maining in Germany.

n. Tourists and Travelers

Before the occupation of Norway, Germany had secured complete information as to the topography of the country, including exceedingly accurate maps. She had sent naval officers to pose as tourists spending the summer yachting in the Norwegian fjords; these officers knew their way perfectly into every Norwegian harbor, even without navigation lights. German "business men" filled the hotels a few days before the occupation; they were all in uniform the morning of the occupation. German vice consuls, press attaches, commercial attaches, and others, were everywhere. All were military men with definite military missions, and they used legation communication facilities until the time of the occupation.

During the critical period last winter when the continued supply of Rumanian oil to the Reich was in doubt, Rumania was filled with thousands of German "tourists". The same was true in Yugoslavia and is true today in Spain and Portugal.

3. FORMS OF ACTIVITY UPON THE OUTBREAK OF HOSTILITIES

Successful use of the Fifth Column after the outbreak of hostilities necessitates extremely careful and thorough preparation before the outbreak of war or the beginning of active operations. When the fighting actually starts, the Fifth Column may perform many functions. Among these are:

- a. Effecting sabotage on a well ordered plan.
- b. Demoralizing and confusing the population and the armed forces by spreading false information, by issuing false orders, and by creating alarms and diversions to draw defending troops away from points of attack.
- c. Seizing critical points by force of arms and holding them until air landing troops or ground troops arrive.
- d. Guiding air landing troops by signalling before they land and by providing guides at landing points to conduct troops rapidly to previously selected objectives, such as telephone exchanges, radio stations, power stations, transportation centers, important bridges, essential factories, and government offices.

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e. Seizing transportation for use of air landing troops, and supplying those troops with food, shelter, and other necessities.

According to the sworn statements of Dutch officers, German Fifth Columnists in the uniform of the Dutch gendarmes prevented destruction of the Maas railroad bridge at Gennet. A German armored train, followed by other troops, crossed this bridge and contributed to the early break-through of the Peel defense position. Destruction of many other bridges of lesser importance near the frontier was prevented through use of similar methods. Organized groups of armed Germans in civilian clothes, identified by green arm bands, seized and held the bridge over the Maas-Waal Canal just before the German attack of May 10. Fifth Columnists cooperated with the air landing troops in the attack on The Hague and Rotterdam. Besides rendering effective assistance to landing troops, they interfered with the Dutch troops who were attempting to meet these attacks by diversion and firing in their rear. Near Rotterdam, they succeeded in seizing and holding the important bridge over the Maas River. The Dutch system of defense by inundation failed to function at many strategic points because of the activities of German Fifth Columnist agencies within Holland.

In Norway, on the day of the attack, agents within the country isolated a large part of the country by seizing the government radio station and telegraph and telephone exchanges. They caused complete confusion by disseminated false orders. Norway, although it realized that the presence of these men was dangerous to its neutrality, had made no serious effort to forestall them for fear of antagonizing her strong German neighbor.

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SPECIAL BULLETIN  
No. 17  
G-2/2657-231

MILITARY INTELLIGENCE DIVISION,  
WAR DEPARTMENT,  
Washington, September 26, 1940.

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FRENCH ARTILLERY, ANTITANK,  
AND ANTIAIRCRAFT WEAPONS

SOURCE

The information contained in this bulletin came from an official British summary of French equipment, dated July 25, 1940. Great importance was attached to the summary since, as a result of the defeat of the French Army, it was expected that the equipment might be used by the Axis powers against the British.

CONTENTS

1. PARTICULARS OF ARTILLERY AND ANTITANK WEAPONS
2. ANTIAIRCRAFT ARTILLERY
  - a. Notes on Fire Control Instruments
  - b. Particulars of Guns

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## I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS

| Serial | Caliber        | Nomenclature   | Type          | Length of Bore in Calibers | Muzzle Velocity in Feet Per Second | Weight of Shell in Pounds | Maximum Range in Yards | Elevation | Depression | Traverse | Rifling        |       | Weight in Action | Remarks  |
|--------|----------------|--|---------------|----------------------------|------------------------------------|---------------------------|------------------------|-----------|------------|----------|----------------|-------|------------------|--|
|        |                |  |               |                            |                                    |                           |                        |           |            |          | No. of Grooves | Twist |                  |  |
| 1.     | 25 mm. (.985") | 25 mm. Semi-Automatic Model 1934                               | Anti-tank Gun | 64                         | 3,000                              | .70                       | 11,200                 | 15°       | 5°         | 60°      | 12             | 6°10' | 1,050 lbs.       | Penetration - 40 mm. plate at 30° at 400 yds. 60 mm. plate at normal at 100 yds.   |
| 2.     | 25 mm. (.985") | 25 mm. Semi-Automatic Model 1935                               | Anti-tank Gun | 50                         | 3,000                              |                           |                        |           |            |          |                |       |                  | This is a shortened 25 mm. model 1934 used on armored cars.  |
| 3.     | 37 mm. (1.45") | 37 mm. Semi-Automatic  | Infantry Gun  | 17                         | 1,200                              | 1.23                      | 2,600                  |           |            |          |                |       |                  | Most accurate range for this gun is said to be 1,100 to 1,300 yds.   |
| 4.     | 37 mm. (1.45") | 37 mm. Rapid Fire Model 1916                                   | Anti-tank Gun | 21                         | 1,970                              | 0.86                      |                        | 17°       | 8°         | 34°      | 12             | 6°    | 240 lbs.         | The original weapon, with muzzle velocity of 1,300 f.s. was issued as an Infantry support gun.   |
| 5.     | 37 mm. (1.45") | 37 mm. Semi-Automatic Model 1918 and Model 1918, Modified 1937 | Tank Gun      | 21                         | 1,970                              | 1.1                       |                        | 20°       | 16° 30'    |          | 12             | 6°    | 158 lbs.         | The modified model is used on the Renault Hotchkiss and F.C.M. tanks. These guns fire the same ammunition as the 37 mm. Rapid Fire Model 1916. |

General Notes: (1) With the exception of the 25 mm., the 37 mm., and the newer 47 mm. antitank guns, and the new 75 mm. antitank-field gun, the French employed almost entirely artillery weapons developed before and during the World War. Other exceptions were the 105C 1935B and the 105C 1934S howitzers. In some of the remaining equipment, carriages had been modified.

(2) For antitank guns, the French used solid shot almost exclusively. The 37 mm. and 47 mm. modern equipments fired solid armor-piercing shot with ballistic cap, as did the 75 mm. gun. The 25 mm. Hotchkiss antitank gun fired solid shot with and without tracer, but it was intended to use in the future only armor-piercing shot with tracer.

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## I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS (Continued)

| Serial | Caliber           | Nomenclature                     | Type          | Length of Bore in Calibers | Muzzle Velocity in Feet Per Second | Weight of Shell in Pounds | Maximum Range in Yards | Elevation | Depression | Traverse | Rifling        |       | Weight in action | Remarks  |
|--------|-------------------|----------------------------------|---------------|----------------------------|------------------------------------|---------------------------|------------------------|-----------|------------|----------|----------------|-------|------------------|--|
|        |                   |                                  |               |                            |                                    |                           |                        |           |            |          | No. of Grooves | Twist |                  |  |
| 6.     | 37 mm.<br>(1.45") | 37 mm. Semi-Automatic Model 1938 | Tank Gun      | 30                         | 2,300                              | 1.54                      |                        | 20°       | 17°        | 10°      | 12             | 7°    | 690 lbs.         | This weapon was intended to replace the armament of the Renault Hotchkiss and F.C.M. (Forges et Chantiers de la Mediterranee) tanks. Penetration: 40 mm. at 400 yds. at normal. 30 mm. at 400 yds. at 30°. |
| 7.     | 37 mm.<br>(1.45") | 37 Casemate Model 1934           | Anti-tank Gun | 50                         | 2,680                              | 1.98                      |                        | 25°       | 15°        | 43°      | 12             | 7°    | 1,100 lbs.       | A cartridge, enabling an armor-piercing shot with ballistic cap weighing 1.98 lbs. to be fired, was believed to be under development.  |
| 8.     | 47 mm.<br>(1.85") | 47 Naval Model 1902              | Anti-tank Gun |                            | 2,260                              | 4.4                       |                        |           |            |          |                |       |                  | Mounted as an antitank weapon in fortified positions.  |
| 9.     | 47 mm.<br>(1.85") | 47 Casemate Model 1934           | Anti-tank Gun | 50                         | 2,800                              | 3.8                       |                        | 10°       | 15°        | 45°      |                |       | 2,200 lbs.       | This model with deepened rifling was mounted in fortifications. Marked with an "A" on breeching.   |
| 10.    | 47 mm.<br>(1.85") | 47 Casemate Model 1934           | Anti-tank Gun | 50                         | 2,260                              | 4.4                       |                        | 10°       | 15°        | 45°      |                |       | 2,200 lbs.       | Employed only in fortifications. It is known as the 47 "with non-deepened rifling" and it is believed was being modified to use the same ammunition as Serial 9 above.                                     |
| 11.    | 47 mm.<br>(1.85") | 47 mm. de Char. Model 1935       | Tank Gun      | 27.6                       | 2,160                              | 3.56                      |                        | 20°       | 15°        |          |                |       | 750 lbs.         | Chief turret armament on the Char B and Souma tanks.   |

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I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS (Continued)

| Serial | Caliber        | Nomenclature             | Type          | Length of Bore in Calibers | Muzzle Velocity in Feet Per Second | Weight of Shell in Pounds | Maximum Range in Yards                  | Elevation | Depression | Traverse                               | Rifling        |       | Weight in Action | Remarks   |
|--------|----------------|--------------------------|---------------|----------------------------|------------------------------------|---------------------------|---|-----------|------------|--|----------------|-------|------------------|---|
|        |                |                          |               |                            |                                    |                           |   |           |            |  | No. of Grooves | Twist |                  |   |
| 12.    | 47 mm. (1.85") | 47 mm. Model 1937        | Anti-tank Gun | 50                         | 2,800                              | 3.8 (Solid Shot Capped).  | 5,500                                   | 13°       | 16°        | 68°                                    |                |       | 2,310 lbs.       | Penetration: 60 mm. at 30° at 600 yds.; 80 mm. at 15° at 200 yds. This gun is believed to be used for antitank defense in fortifications on a twin mounting as well as on normal wheel mountings. |
| 13.    | 47 mm. (1.85") | 47 mm. Model 1939        | Anti-tank Gun | 50                         | 2,800                              | 3.8 (Solid Shot Capped)   | 5,500                                   | 15°       | 5°         | 45° on wheels 360° on 3-Armed Mounting |                |       |                  | Penetration as for Serial 12. Pneumatic tired wheels.   |
| 14.    | 65 mm. (2.56") | 65 mm. Model 1906        | Mountain Gun  | 16                         | 1,080                              | 8.75                      | 7,000                                   | 35°       | 10°        | 6°                                     | 24             | 7°    | 900 lbs.         | This gun fires both shrapnel and high explosive shell. It can be carried in 4 packloads of 230 lbs. each.   |
| 15.    | 75 mm. (2.95") | 75 Model 1919 Model 1928 | Mountain Gun  | 13.4                       | 1,310                              | 14                        | 9,600                                   | 40°       | 10°        | 10°                                    | 24             | 8°    | 1,540 lbs.       | Fires both shrapnel and high explosive. Carried in 7 loads.   |
| 16.    | 75 mm. (2.95") | 75 mm. Model 1897        | Field Gun     | 30.5                       | 2,050                              | 12.5                      | 14,000 (Steel Ballistic Cap 1938 Shell) | 18°       | 11°        | 6°                                     | 24             | 7°    | 1.25 tons        | The range quoted is with new streamlined high explosive shell. The maximum range with Model 1918 high explosive shell is 11,400 yds; range with shrapnel is 7,700 yds.                            |

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I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS (Continued)

| Serial | Caliber            | Nomenclature                             | Type                | Length of Bore in Calibers | Muzzle Velocity in Feet Per Second                   | Weight of Shell in Pounds      | Maximum Range in Yards                      | Elevation | Depression | Traverse  | Rifling        |       | Weight in Action  | Remarks   |
|--------|--------------------|--|---------------------|----------------------------|--|--------------------------------|---|-----------|------------|---|----------------|-------|---|---|
|        |                    |  |                     |                            |  |                                |   |           |            |   | No. of Grooves | Twist |   |   |
| 17.    | 75 mm.<br>(2.95")  | 75 Model 1897,<br>Modified 1933          | Field Gun           | 30.5                       | 2,050  | 12.5<br>14                     | 14,000<br>(Steel Ballistic Cap Shell, 1938) | 45°       | 5°         | 55°   | 24             | 7°    | 1.5 tons  | This gun fires the same ammunition as the Model 1897, and the same remarks apply. It is the same piece mounted on a modernized carriage. Solid armor-piercing shot weighing 14.1 pounds is employed for antitank use. |
| 18.    | 75 mm.<br>(2.95")  |  | Anti-tank Field Gun |                            | 2,100  | 14 (Armor-Piercing Solid Shot) |   |           |            | 360° on 3-Armed Mounting when used as Anti-tank Gun |                |       | Heavier than the 75 Model 1897/33 Field Gun at Serial 17. | Prototype completed successful trials in March, 1940. An entirely new model by Bourges to fulfil both antitank and normal field gun roles.  |
| 19.    | 75 mm.<br>(2.95")  |  | Long Tank Gun       |                            | High Explosive Solid Armor-Piercing Shot, 1,940 f.s. | 14 (Armor-Piercing Solid Shot) |   | 30°       | 10°        | 12°   |                |       |   | Used as mobile artillery. Mounted in hull of the Somua tank, armored on a 40 mm. basis and capable of a road speed of 18.7 m.p.h. 32 of these equipments exist.   |
| 20.    | 75 mm.<br>(2.95")  |  | Short Tank Gun      |                            |  |                                |   |           |            |   |                |       |   | Mounted in standard Somua tank.   |
| 21.    | 105 mm.<br>(4.14") | 105C* 1935B<br>(Manufactured by Bourges) | Howitzer            | 11                         | 1,450  | 34.5                           | 11,200                                      | 50°       | 6°         | 53°   | 32             | 8°    | 1.6 tons  | The carriage is believed to be the same as the 75 Model 1897, Modified 1933. The accuracy of this piece is said to be excellent.  |

\* The letter "C" stands for "court" (short) and indicates a length of less than 20 calibers.

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I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS (Continued)

| Serial | Caliber         | Nomenclature                           | Type              | Length of Bore in Calibers | Muzzle Velocity in Feet Per Second | Weight of Shell in Pounds | Maximum Range in Yards | Elevation | Depression | Traverse              | Rifling        |        | Weight in Action | Remarks   |
|--------|-----------------|--|-------------------|----------------------------|------------------------------------|---------------------------|------------------------|-----------|------------|-----------------------|----------------|--------|------------------|---|
|        |                 |  |                   |                            |                                    |                           |                        |           |            |                       | No. of Grooves | Twist  |                  |   |
| 22.    | 105 mm. (4.14") | 105C 1934S (Manufactured by Schneider) | Howitzer          | 15                         | 1,525                              | 34.5                      | 11,200                 | 50°       | 6°         | 39°                   | 32             | 8°     | 1.7 tons         | Considered a more robust equipment than Serial 21.  |
| 23.    | 105 mm. (4.14") | 105M Model 1919 and Model 1928         | Mountain Howitzer | 12                         | 1,150                              | 26.5                      | 8,500                  | 43°       | 0°         | 9°                    | 32             | 12°    | .75 tons         |   |
| 24.    | 105 mm. (4.14") | 105L* 1913                             | Gun               | 22                         | 1,800                              | 35.2                      | 13,400                 | 37°       | 0°         | 6°                    | 40             | 7° 10' | 2.3 tons         |   |
| 25.    | 105 mm. (4.14") | 105L 1936S (Manufactured by Schneider) | Gun               | 37.5                       | 2,410                              | 35                        | 18,900                 | 43°       | 0°         | 50°                   |                |        | 3.4 tons         | Mounted on rubber tired wheels for motor traction.  |
| 26.    | 120 mm. (4.72") | 120L Model 1878                        | Gun               | 20.4                       | 1,920                              | 41                        | 13,800                 | 30°       | 0°         |                       | 36             | 7°     | 4 tons           | An old gun which may not be in use at the present time.   |
| 27.    | 145 mm. (5.71") | 145 Model 1916                         | Gun               | 42                         | 2,570                              | 74                        | 19,700                 | 38°       | 0°         | 6° 360° on Turn-Table | 42             | 5° 13' | 12.5 tons        | The life of this piece is 3,000 rounds. It is then bored out to 155 mms., when it becomes known as 155L Model 1916. |
| 28.    | 155 mm. (6.1")  | 155C 1917                              | Howitzer          | 11.2                       | 1,480                              | 82                        | 12,500                 | 42°       | 0°         | 6°                    | 48             | 7°     | 3.5 tons         | Life: 8,000 rounds.   |
| 29.    | 155 mm. (6.1")  | 155L Model 1918                        | Gun               | 20                         | 1,980                              | 82                        | 15,200                 | 40°       | 5°         | 6°                    | 48             | 7°     | 5 tons           | Life: 6,000 rounds.   |
| 30.    | 155 mm. (6.1")  | 155L Model 1877 1914                   | Gun               | 20                         | 1,990                              | 82                        | 15,500                 | 40°       | 5°         | 5°                    | 48             | 7°     | 6 tons           | Life: 6,000 rounds.   |

\* The letter "L" stands for "long" and indicates a length of more than 20 calibers.

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I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS (Continued)

| Serial | Caliber         | Nomenclature   | Type        | Length of Bore in Calibers | Muzzle Velocity In Feet Per Second | Weight of Shell in Pounds | Maximum Range in Yards | Elevation | Depression | Traverse              | Rifling        |       | Weight in Action | Remarks   |
|--------|-----------------|--|-------------|----------------------------|------------------------------------|---------------------------|------------------------|-----------|------------|-----------------------|----------------|-------|------------------|---|
|        |                 |  |             |                            |                                    |                           |                        |           |            |                       | No. of Grooves | Twist |                  |   |
| 31.    | 155 mm. (6.1")  | 155 1.1877   | Gun         | 20.45                      | 1,690                              | 95.4                      | 13,900                 | 30°       | 0°         | 60° on platform       | 48             | 7°    | 6.5 tons         | Life: 6,000 rounds.   |
| 32.    | 155 mm. (6.1")  | 155L Model 1917                                      | Gun         | 24                         | 2,180                              | 95                        | 19,000                 | 40°       | 5°         | 45°                   | 48             | 7°    | 8.75 tons        | Life: 4,000 rounds.   |
| 33.    | 155 mm. (6.1")  | 155 Grand Puissance Filloux (Long-Range Filloux Gun) | Gun         | 29.8                       | 2,380                              | 95                        | 21,300                 | 35°       | 0°         | 60°                   | 48             | 6°    | 11.2 tons        | A new design, the long-range Filloux gun adapted for high speed, is believed to have been adopted and may have been in production. The carriage is modified to give a maximum elevation of 39° and an average speed of 19 m.p.h. when towed by tractor. Its life is about 4,000 rounds. |
| 34.    | 155 mm. (6.1")  | 155L Model 1916                                      | Gun         | 37.8                       | 2,590                              | 95                        | 22,000                 | 38°       |            | 6° 360° on Turn-Table | 48             | 5°35' | 12.5 tons        | This is the 145 Model 1916 rebored.   |
| 35.    | 164 mm. (6.46") | 164 mm. Model 1893, Modified 1896                    | Railway Gun | 45                         | 2,540                              | 110                       | 19,600                 | 40°       |            | 360°                  | 50             | 5°    | 60 tons          | This is a naval gun on a railway mounting.  |
| 36.    | 194 mm. (7.65") | 194 mm. Model 70/93                                  | Railway Gun | 23.7                       | 2,100                              | 184                       | 19,900                 | 40°       |            | 360°                  | 38             | 7°    | 65 tons          |   |

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I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS (Continued)

| Serial | Caliber            | Nomenclature               | Type              | Length of Bore in Calibers | Muzzle Velocity in Feet Per Second | Weight of Shell in Pounds | Maximum Range in Yards | Elevation | Traverse                 | Rifling        |       | Weight in Action | Remarks   |
|--------|--------------------|----------------------------|-------------------|----------------------------|------------------------------------|---------------------------|------------------------|-----------|--------------------------|----------------|-------|------------------|---|
|        |                    |                            |                   |                            |                                    |                           |                        |           |                          | No. of Grooves | Twist |                  |   |
| 37.    | 194 mm.<br>(7.65") | 194 Long-Range Filloux Gun | Gun               | 29.8                       | 2,300                              | 187                       | 20,700                 | 37°       | 360°                     | 48             | 6°    | 30 tons          | This equipment is mounted on a St. Chamond tracked carriage. In transport there are 2 tracked vehicles; the first carries a gasoline-electric generator set and the ammunition, while the second carries the gun. |
| 38.    | 220 mm.<br>(8.66") | 220C Model 1916            | Howitzer          | 7                          | 1,360                              | 221                       | 12,200                 | 65°       | 6°                       | 92             | 10°   | 7.8 tons         | Life: 6,000 rounds.   |
| 39.    | 220 mm.<br>(8.66") | 220L Model 1917            | Gun               | 27.8                       | 2,500                              | 226.8                     | 25,000                 | 37°       | 21°                      | 92             | 7°    | 22 tons          |   |
| 40.    | 240 mm.<br>(9.45") | 240 Model 1884             | Railway Gun       | 21                         | 2,020                              | 350                       | 20,600                 | 38°       | 360°                     | 72             | 7°    | 90 tons          | The gun carriage is mounted on two 3-axle bogies.   |
| 41.    | 240 mm.<br>(9.45") | 240 Model 1903. Rapid fire | Truck Mounted Gun | 21                         | 1,970                              | 307                       | 18,900                 | 35°       | 14° or 28° Rotating Base |                |       | 50 tons          | This is a coast defense gun mounted on a truck. Very few now exist. Believed to be replaced by 220L.  |
| 42.    | 240 mm.<br>(9.45") | 240 Model 1917             | Howitzer          | 21                         | 2,100                              | 352                       | 20,500                 | 38°       | 10°                      | 84             | 6°    | 31 tons          | A platform-mounted gun which can be transported on 2 vehicles, tractor drawn.   |

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I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS (Continued)

| Serial | Caliber         | Nomenclature                  | Type        | Length of Bore in Calibers | Muzzle Velocity in Feet Per Second | Weight of Shell in Pounds | Maximum Range in Yards | Elevation                                    | Traverse | Rifling        |       | Weight in Action | Remarks   |
|--------|-----------------|-------------------------------|-------------|----------------------------|------------------------------------|---------------------------|------------------------|--|----------|----------------|-------|------------------|---|
|        |                 |                               |             |                            |                                    |                           |                        |  |          | No. of Grooves | Twist |                  |   |
| 43.    | 240 mm. (9.45") | 240 Model 1893, Modified 1896 | Railway Gun | 30.83                      | 2,760                              | 357                       | 26,000                 | 35°; Across Track<br>29°; Along Track<br>40° | 360°     | 72             |       | 140 tons         | Mounted on carriage with two 6-axle bogies.   |
| 44.    | 274 mm. (10.8") | 274 Model 1887 and Model 1917 | Railway Gun | 45                         | 2,580                              | 522                       | 28,300                 |  |          | 82             | 5°    | 160 tons         | This gun is worked on a curved track 80 to 100 meters radius. Some have been rebored to 285 mm.   |
| 45.    | 280 mm. (11")   | 280 mm. Mortar                | Howitzer    | 9.4                        | 1,370                              | 440                       | 12,000                 | 60°  | 20°      |                |       | 16.25 tons       | This gun is also mounted on a tracked carriage similar to that of the 194 long-range Filloux gun (Serial 37). The weight of the vehicle equipment is 28 tons. |
| 46.    | 285 mm. (11.2") | 285 Model 1917                | Railway Gun | 38                         | 2,420                              | 595                       | 29,400                 | 40°  |          | 82             | 5°    | 160 tons         | This is the 274 mm. gun rebored. It is used on a curved track.  |
| 47.    | 305 mm. (12")   | 305 Model 1893, Modified 1896 | Railway Gun | 30                         | 2,600                              | 770                       | 30,000                 | 38°  |          | 90             | 4°    | 182 tons         | Mounted on two 6-axle bogies.   |
| 48.    | 305 mm.         | 305 Model 1906, Modified 1910 | Railway Gun | 30                         | 2,820                              | 693                       | 37,000                 | 38°  |          | 90             | 4°    | 182 tons         | Mounted on same carriage as Model 1893, Modified 1896.  |

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I. PARTICULARS OF FRENCH ARTILLERY AND ANTITANK WEAPONS (Continued)

| Serial | Caliber         | Nomenclature                                  | Type             | Length of Bore in Calibers | Muzzle Velocity in Feet Per Second | Weight of Shell in Pounds | Maximum Range in Yards | Elevation | Traverse | Rifling        |       | Weight in Action | Remarks   |
|--------|-----------------|---|------------------|----------------------------|------------------------------------|---------------------------|------------------------|-----------|----------|----------------|-------|------------------|---|
|        |                 |   |                  |                            |                                    |                           |                        |           |          | No. of Grooves | Twist |                  |   |
| 49.    | 320 mm. (12.6") | 320 Model 1870, Modified 1884, and Model 1893 | Railway Gun      | 30                         | 2,100                              | 850                       | 23,600                 | 40°       |          | 64             | 7°    | 163 tons         | Mounted on two 5-axle bogies.   |
| 50.    | 320 mm. (12.6") | 320 Model 1917                                | Railway Gun      | 35                         | 2,260                              | 850                       | 29,200                 | 40°       |          | 64             | 7°    | 178 tons         | Mounted on two 5-axle bogies.   |
| 51.    | 340 mm. (13.4") | 340 Model 1884                                | Railway Gun      | 28.5                       | 1,900                              | 1,020                     | 20,000                 | 40°       |          | 102            | 7°    | 187 tons         | Mounted on two 6-axle bogies.   |
| 52.    | 340 mm. (13.4") | 340 Model 1893                                | Railway Gun      | 35                         | 2,420                              | 1,020                     | 29,400                 | 40°       |          | 102            | 5°    | 187 tons         | Mounted on two 6-axle bogies.   |
| 53.    | 340 mm. (13.4") | 340 Model 1912                                | Railway Gun      | 43                         | 2,860                              | 980                       | 36,400                 | 37°       |          | 102            | 6°    | 270 tons         | Gun platform carried at each end by double 4-axle bogies. Length: 110 ft.         |
| 54.    | 370 mm. (14.6") | 370 Model 1875, Modified 1879                 | Railway Gun      | 28.5                       | 1,885                              | 1,560                     | 24,600                 | 40°       |          | 112            | 7°    | 250 tons         | Each end of gun platform carried on double 4-axle bogies.                         |
| 55.    | 520 mm. (20.5") | 520 Model 1918                                | Railway Howitzer | 16                         | 1,475                              | 3,630                     | 15,900                 | 60°       |          | 168            | 7°    | 253 tons         | Gun platform carried at each end on double 4-axle bogies. All electric operation. |

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2. ANTIAIRCRAFT ARTILLERY

a. Notes on Fire Control Instruments

(1) General: French antiaircraft control equipment does not appear to be as comprehensive and up-to-date as that of the other great powers, and little recent equipment seems to have been produced.

(2) Predictors: Very little information is available with regard to the types and the theory upon which the French based their calculations. A Brock predictor was produced shortly after the last war, but it is not known whether it is still in use or whether there was a later model. It is known that a type of predictor with electrical transmission was used, but technical details are not available.

(3) Receiver Dials: These were on the vertical scale type as opposed to the circular scale type with the "follow the pointer" system which is in use in Great Britain. Coincidence was maintained by means of a mechanical pointer.

(4) Fuze Setter: These were used on all heavy types of antiaircraft guns, but whether the predicted fuze was transmitted electrically or verbally from the command post is not known.

(5) Height Finders: Two main types are known to have been in use; both were based on the coincidence system. These types were:

(a) The Levallois No. 9 Mark 1,  
5 meter base;

(b) The S. O. M., 4 meter base.  
Transmission from the height-finder to  
the predictor appears to have been verbal.

(6) Searchlights: The most recent known type was the 150 cm. 1939 model made by Messrs. Barbier, Banard, Turenne.

(7) Sound Locators: Various types, principally models made by Messrs. Barbier, Banard, Turenne, were in use.

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II. B. PARTICULARS OF FRENCH ANTIAIRCRAFT GUNS

| Serial | Type of Antiaircraft Gun | Length in Calibers | Muzzle Velocity in Feet Per Second | Maximum Range in Yards | Maximum Vertical Range in Feet | Effective Ceiling in Feet | Weight of Projectile in Pounds | Use of Tracer with High Explosive Shells | Practical Rate of Fire in R.P.M. | Weight in Action | Weight in Draft | Maker and Year | Remarks   |
|--------|--------------------------|--------------------|------------------------------------|------------------------|--------------------------------|---------------------------|--------------------------------|--|----------------------------------|------------------|-----------------|----------------|---|
| 1      | 20 mm. (.79")            | 70                 | 2720                               | 5,500                  | 12,200                         | 7,000                     | .55                            | Tracer                                   | 140                              |                  |                 | Oerlikon       | Considerable use was made of these small caliber weapons.   |
| 2      | 20 mm. (.79")            |                    | 3280                               |                        |                                | 7,000                     | .363                           | Tracer                                   | 140                              | 770 lbs.         |                 | Hotchkiss      |   |
| 3      | 25 mm. (.99")            | 81                 | 2950                               | 7,850                  | 16,400                         | 10,000                    | .55                            | Tracer                                   | 120                              | 1.2 tons         |                 | Hotchkiss      |   |
| 4      | 37 mm. (1.45")           | 48                 | 2650                               | 9,900                  | 20,000                         | 13,000                    | 1.98                           | Tracer                                   | 100                              | 2950 lbs.        | 3960 lbs.       | Schneider 1938 |   |
| 5      | 37 mm. (1.45")           | 60                 | 2520                               | 8,400                  | 16,400                         | 12,500                    | 2.16                           | Tracer                                   | 100                              | 3157 lbs.        |                 | Hotchkiss 1925 |   |
| 6      | 40 mm. (1.54")           | 60                 | 2750                               | 12,400                 | 16,300                         | 14,000                    | 2.2                            | Tracer                                   | 80                               | 4234 lbs.        | 4234 lbs.       | Bofors 1936    |   |
| 7      | 75 mm. (2.95")           |                    |                                    |                        |                                |                           |                                |  |                                  |                  |                 | Schneider 1928 | The 75 was the chief heavy antiaircraft gun. All models are believed to have been based upon the 75 mm. field gun and mounted upon various types of antiaircraft platforms. |
| 8      | 75 mm. (2.95")           | 44                 | 2460                               | 15,200                 | 29,500                         | 22,000                    | 14.3                           | No Tracer                                | 20                               | 2.75 tons        | 3.47 tons       | Schneider 1932 |   |
| 9      | 75 mm. (2.95")           | 49                 | 2620                               | 16,000                 | 32,500                         | 25,000                    | 14.3                           | No Tracer                                | 20                               | 2.7 tons         | 3.5 tons        | Schneider 1935 |   |

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II. B. PARTICULARS OF FRENCH ANTIAIRCRAFT GUNS (Continued)

| Serial | Type of Antiaircraft Gun | Length in Calibers | Muzzle Velocity in Feet Per Second | Maximum Range in Yards | Maximum Vertical Range in Feet | Effective Ceiling in Feet | Weight of Projectile in Pounds | Use of Tracer with High Explosive shells | Practical Rate of Fire in R.P.M. | Weight in Action | Weight in Draft | Maker and Year | Remarks   |
|--------|--------------------------|--------------------|------------------------------------|------------------------|--------------------------------|---------------------------|--------------------------------|--|----------------------------------|------------------|-----------------|----------------|---|
| 10     | 75 mm. (2.95")           |                    |                                    |                        |                                |                           |                                |  |                                  |                  |                 | Schneider 1939 | The 75 was the chief heavy antiaircraft gun. All models are believed to have been based upon the 75 mm. field gun and mounted upon various types of antiaircraft platforms. |
| 11     | 75 mm. (2.95")           | 40                 | 2280                               | 14,600                 | 31,000                         | 20,000                    | 14.3                           | No Tracer                                | 15-20                            | 2.4 tons         | 3.5 tons        | Puteaux        |   |
| 12     | 90 mm. (3.55")           | 42                 | 2675                               | 18,600                 | 38,250                         | 27,000                    | 24.8                           | No Tracer                                | 15                               | 5.7 tons         | 7.7 tons        | Schneider 1939 | There may also have been in existence some Bofors 80 mm. (3.12 in.) anti-aircraft equipments.   |
| 13     | 105 mm. (4.14")          | 45                 | 2950                               | 19,800                 | 36,000                         | 30,000                    | 35                             | No Tracer                                | 10-15                            | 6.5 tons         |                 | Schneider 1928 |   |

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SPECIAL BULLETIN  
No. 18  
G-2/2657-231

MILITARY INTELLIGENCE DIVISION  
WAR DEPARTMENT  
Washington, September 26, 1940

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MISCELLANEOUS FRENCH EQUIPMENT

SOURCE

Information in this bulletin is from an official British summary of French equipment, dated July 25, 1940. Other French equipment from the same source has been summarized as follows: French Tanks and Armored Cars, SPECIAL BULLETIN NO. 12; French Defense Against Tanks, TENTATIVE LESSONS BULLETIN NO. 33; French Artillery, Antitank and Antiaircraft Weapons, SPECIAL BULLETIN NO. 17.

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1. MORTARS

The following are particulars of the mortars in use with the French Army:

a. Brandt Mortar 27/31

Caliber: 81 mm. (3.19")  
Type of mounting: Bipod and base plate  
Method of firing: Percussion  
Weight of barrel: 20 kg. (44 lbs.)  
Weight of base plate: 22 kg. (48.5 lbs.)  
Weight of bipod or tripod: 18 kg. (39.6 lbs.)  
Maximum range: 3016 meters (3298 yds.)  
Minimum range: 20 meters (22 yds.)  
Maximum rate of fire: 30 to 35 r.p.m.  
Practical rate of fire: 18 r.p.m.  
Angle of fire: 40° to 85°  
Weight of complete bomb: Standard, 3.2 kg. (7.05 lbs.), High Explosive, 6.4 kg. (14.2 lbs.)  
Weight of explosive charge: Standard, .46 kg. (1 lb.), High Explosive, 1.9 kg. (4.2 lbs.)  
Propellant: Ballistite cartridge  
Transport: 3 man load or 2 pack horses with ammunition

The ammunition for this mortar would probably be interchangeable with that of the German mortar of the same caliber.

b. Brandt 120 mm. Mortar

Caliber: 120 mm. (4.72")  
Total weight: 780 kg. (1720 lbs.)  
Maximum range: 7312 meters (7926 yds.)  
Danger area of burst of high explosive bomb:  
Equivalent to 6" shell  
Maximum rate of fire: 6 r.p.m.  
Practical rate of fire: 4 r.p.m.  
Weight of complete bomb: 16.3 kg. (35.9 lbs.)  
Weight of explosive charge: 4.275 kg. (9.4 lbs.)  
Propellant: Ballistite cartridge  
Transport: Small tractor, 2 horses, or 6 men

c. Grenade-Thrower M.37

Caliber: 50 mm. (2")  
Type of mounting: Base plate and bipod  
Method of firing: Percussion

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Total weight: 3.3 kg. (7.3 lbs.)  
Minimum range: 500 meters (547 yds.)  
Minimum range: 70 meters (77 yds.)  
Maximum rate of fire: 20 r.p.m.  
Practical rate of fire: 15 r.p.m.  
Angle of fire: Fixed at 45°  
Weight of complete bomb: .45 kg. (.99 lb.)  
Propellant: Cartridge (probably 12-bore ballistite)  
Details of bomb: High explosive, cast iron body,  
short delay fuse. Smoke, N.3.C. type  
Transport: One man load.

A special breach-loading pattern of the 50 mm. mortar is used in casemates. With a lengthened barrel, it has an increased range.

d. M.35 Brandt

Caliber: 60 mm. (2.4")  
Type of mounting: Bipod and base-plate  
Method of firing: Percussion  
Total weight: 17.2 kg. (37.9 lbs.)  
Maximum range: 1005 meters (1099 yds.)  
Maximum rate of fire: 30 r.p.m.  
Practical rate of fire: 18 r.p.m.  
Angle of fire: 45° to 83°  
Weight of complete bomb: 1.36 kg. (3 lbs.)  
Transport: One man load; one horse load of mortar  
and 48 bombs  
Other details: Normal crew of 3 men

2. MACHINE PISTOLS AND SUB-MACHINE GUNS

The following types are known to have been in use in the French Army, probably in limited numbers:

a. Mas 1935 Model Machine Pistol

Caliber: 7.65 mm. (.3")  
Length overall: 63 cm. (24.8 in.)  
Total weight: 2.9 kg. (6.4 lbs.)  
Type of ammunition feed: Box magazine  
Magazine or belt capacity: 32 rounds  
Maximum rate of fire: 700 r.p.m.  
Sights: Graded for ranges of 100 and 200 meters  
(109 and 218 yds.)  
Maximum effective range: 200 m. (218 yds.)  
Cooling: Air

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Type of ammunition: 7.65 L. (long)  
Constructed for rapid fire only.

b. Thompson Sub-Machine Gun

Caliber: 11.25 mm. (.44")  
Length overall: With butt, 80 cm. (31.5")  
Without butt, 58 cm. (22.8")  
Weight without magazine or butt: 3.8 kg. (8.4 lbs.)  
Weight without magazine with butt: 4.5 kg. (9.9 lbs.)  
Type of ammunition feed: Box or drum type magazines.  
Magazine or belt capacity: Box, 20 rounds  
Drum, 50 rounds.  
Maximum rate of fire: 900 r.p.m.  
Method of operation: Gas  
Cooling: Air  
Will fire single shots or rapid fire.

It should be noted that this weapon is of larger caliber than the other French and German machine pistols and sub-machine guns.

c. Schmeisser Machine Pistol

Caliber: 9 mm. (.35")  
Weight: 4.1 kg. (9 lbs.)  
Length: 81 cm. (31.9")  
Magazine Capacity: Box, 32 rounds  
Maximum effective range: 200 meters (218 yds.)  
Maximum rate of fire: 50 r.p.m.  
Sights: Graduated to 1,000 meters (1093 yds.)  
Type of ammunition: Same as the Erma machine pistol (next paragraph)  
Single shots can be fired if desired.

d. Erma Machine Pistol

Caliber: 9 mm. (.35")  
Weight: 4.1 kg. (9 lbs.)  
Length: 89 cm. (35")  
Magazine capacity: 30 rounds  
Maximum rate of fire: 500 r.p.m.  
Sights: Graduated from 50 to 100 meters (55 to 109 yds.)  
This weapon will fire single shots or bursts.

The Schmeisser and Erma pistols are to all intents and purposes identical with the German weapons of the same name.

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3. RIFLES, AUTOMATIC RIFLES, AND PISTOLS

a. Rifle, Lebel Model 86-93

Caliber: 8 mm. (.31")  
Weight: 3.76 kg. (8 lbs. 5 oz.)  
Range: 959 m. (1048 yds.)  
Ammunition: Type 1886 D.  
Muzzle velocity: 670 m.s. (2198 f.s.)

b. Rifle, Lebel Model 16

Caliber: 8 mm. (.31")  
Weight: 4.2 kg (9.3 lbs.)  
Range: 1306 meters (1428 yds.)  
Muzzle velocity: 701 m.s. (2300 f.s.)  
Ammunition: Type 1886 D.

c. Rifle, Lebel Model 07 - 15 M. 34

Caliber: 7.5 mm. (.3")  
Weight: 3.7 kg. (8.2 lbs.)  
Range: 1080 meters (1181 yds.)  
Ammunition: Model 1929 C.  
Muzzle velocity: 820 m.s. (2690 f.s.)

d. Rifle, Model 1936

(This rifle had been issued, so far as known, to only a few units. Its details were "confidential" but it is known to be similar to the Lebel rifle (c) although somewhat lighter. It used clips of 5 rounds, 7.5 mm. ammunition. Total length about 110 cm. or 43.3 in. G-2.)

e. 1936 Model Repeating Rifle with Folding Butt

This weapon, intended for use by parachute troops and ski troops, is in general principle the same as the 1936 Model rifle. It is shorter, however, and the butt, made of a light alloy, is hollowed out and can be folded back on to the barrel casing. Its characteristics are as follows:

Caliber: 7.5 mm. (.3")  
Total length: 89 cm. (35")  
Length with butt folded: 62 cm. (24.4")

f. Mas Automatic Rifle

Caliber: 7.5 mm. (.3")

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Weight without bayonet: 3.9 kg. (8.6 lbs.)  
Total length without bayonet: 1.06 meters (41.7")  
Magazine capacity: 6 cartridges  
Practical rate of fire: 30 r.p.m.  
Ammunition: 1929 C model

g. Pistols and Revolvers

The service revolver is the 6-chambered 1892 pattern weapon which has a caliber of 8 mm. (.31") and weighs 1 lb. 13 oz. Several patterns of automatic pistol were in service, including the Star, Ruby, and Colt. They were all 7.65 (.3") caliber. They use Browning ammunition.

4. MACHINE GUNS

a. Chatellerault M 24/29 Light Machine Gun

Caliber: 7.5 m. (.3")  
Length of barrel: 49.4 cm. (19.4")  
Weight of weapon: With mounting, 9.3 kg. (205 lbs.)  
Without mounting, 8.5 kg. (18.7 lbs.)  
Type of ammunition feed: Box type magazine  
Magazine or belt capacity: 25 rounds  
Maximum rate of fire: 600 r.p.m.  
Practical rate of fire: 400 r.p.m.  
Method of operation: Gas  
Sights: Radial backsight and adjustable foresight  
Maximum range: 4,000 meters (4374 yds.)  
Effective range: 731 meters (799 yds.)  
Muzzle velocity: 820 m.s. (2690 f.s.)  
Type of mounting: Bipod and butt-stand  
Cooling: Air  
Type of ammunition: Rimless model 1929 C  
Transport: One man load  
Can be used on an antiaircraft mounting with special ring sight.

b. M.A.C. Light Machine Gun

Caliber: 7.5 mm. (.3")  
Total weight: 14.2 kg. (31.3 lbs.)  
Maximum rate of fire: 930 r.p.m.  
Practical rate of fire: 370 r.p.m.  
Method of operation: Gas  
Maximum range: 5200 meters (5687 yds.)  
Muzzle velocity: 700 m.s. (2297 f.s.)  
Type of mounting: Tripod Model 1916

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Cooling: Air  
 Penetration: 9 mm. armor at 0° at 200 meters  
 9 mm. armor at 30° at 100 meters  
 Under trial in April, 1940.

c. Hotchkiss M.14 Machine Gun

Caliber: 8 mm. (.31")  
 Total weight: 51 kg. (112.4 lbs.)  
 Weight of mounting: 24 kg. (52.9 lbs.)  
 Weight of weapon without mounting: 27 kg. (59.6 lbs.)  
 Type of ammunition feed: Strip or metal belt  
 Magazine or belt capacity: Strip of 24 cartridges  
 or belt of 251 cartridges  
 Maximum rate of fire: 450 r.p.m.  
 Practical rate of fire: 200 to 250 r.p.m.  
 Method of operation: Gas  
 Maximum range: 4500 meters (4921 yds.)  
 Effective range: Direct, 2400 meters (2625 yds.)  
 Indirect, 3500 meters (3828 yds.)  
 Muzzle velocity: 700 m.s. (2297 f.s.)  
 Type of mounting: Tripod  
 Cooling: Air  
 Type of ammunition: Model 1932

d. Hotchkiss 13.2 mm. Machine Gun

Caliber: 13.2 mm. (.52")  
 Weight of weapon: 200 kg. (440.9 lbs.)  
 Maximum rate of fire: 500 r.p.m.  
 Practical rate of fire: 180 to 250 r.p.m.  
 Maximum range: Horizontal, 7000 meters (7655 yds.)  
 Vertical, 3000 meters (3281 yds.)  
 Muzzle velocity: 800 m.s. (2624 f.s.)  
 Penetration: 20 mm. of armor at 500 yds., 15 mm.  
 of armor at 1100 yds.

The 13.2 mm. Hotchkiss is primarily an antiaircraft weapon but it can also be used for antitank purposes.

5. BRIDGING

a. Girder Bridges

The French regarded the launching of girder and stock span bridges as an operation to be undertaken in back areas, and not under assault conditions. The principal semi-permanent girder bridges used by the French are given in the following table:

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| <u>Type</u>         | <u>Span</u><br>(Meters) | <u>Load</u><br>(Tons) | <u>Width of</u><br><u>Track</u><br>(Meters) | <u>Remarks</u>   |
|---------------------|-------------------------|-----------------------|---|--|
| Pigeaud             | 50                      | 44                    |   | Developed during the last war  |
| Road Bridge Type A. | 25                      | 25                    | 3   |  |
| Road Bridge Type B. | 35                      | 35                    | 2.9   |  |
| 11 Ton Track Bridge | 7                       | 11                    |   | Designed for crossing canal and river locks; only the prototype of this bridge had been constructed in March, 1940 |

b. Ponton Equipment

1. A variety of types of pontons and ponton equipment was used by the French Army, the principal type being what was known as the Modele 1935 equipment. This includes open Duralumin pontons 9 x 1.8 x 9 meters deep, flat bottomed and of square section. Road-bearers are of steel 4 meters and 2 meters long rigidly connected between bays and rafts by fishplates and thus forming, in effect, continuous beams. The roadway is 2.88 meters in the clear between ribands and is laid with timber chesses similar to those used by the British.

The load capacity depends on the spacing of pontons.. Provided the speed of the current does not exceed about 6 knots, the rating is as follows:

| <u>Ponton Spacing</u><br>(Centers)<br>(Meters) | <u>Load</u><br>(Tons) |
|--|-----------------------|
| 6  | 8                     |
| 4  | 13                    |
| 2  | 18                    |
| 2 (reinforced<br>superstructure)               | 20.5                  |

The equipment also includes trestles similar to those used by the British, the load capacity being 20.5 tons and the distance between piers 5.5 meters. A train load of this equipment would take about 120 meters of 18-ton bridge, including a proportion of trestle piers. The same amount of equipment could be carried on eighty 5-ton trucks.

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2. Other ponton equipment used in the French Army is described as follows:

a. The Modele 1901-1935 is similar to, but superseded by, the 1935 equipment described above. The pontons are round bottomed and slightly smaller. In consequence, the load capacity is less, the ratings corresponding to those above being 6, 11 and 16 tons. The superstructure and trestles are the same as for the 1935 equipment.

b. F.C.M. Equipment is a heavier type of equipment taking up to 23 tons in bridge and 21 tons in rafts. The pontons are larger than the 1935 type, and the principal roadbearers are of the girder type. Trestles form part of the equipment and are interchangeable with the 1935 type.

c. The New Cavalry Bridge consists of open Duralumin pontons slightly smaller than those of the 1935 equipment with standard 1935 roadbearers and paved decking laid single for light Infantry and double for heavy bridge. A 4-boat raft will take 13-ton tanks and a raft of the same span with three boats, 9 tons. A continuous bridge of either type can be made.

d. The 14-ton Tank Raft had been approved but was not in production in March, 1940. The boats are special, square-ended, open Duralumin pontons on which the roadway is laid, with use made of normal heavy bridge superstructure. Access to the raft is obtained by special ramps 5.5 meters long, carried on two brackets clamping to the main transoms at either end, and lifted by standard boat davits and winches mounted at the bow and stern of the pontoons.

c. Light Assault Bridges and Boats

The French had a folding boat known as the Veyry Model, 1930, which could be used as a single boat ferry, in rafts, or made up into a light Infantry bridge of 1 ton maximum capacity. In addition to the Veyry Bridge, there were two types of wooden boats or punts, one made out of scantlings and sawed timber found on the site, and the other made up on the site from sets of plank-ing prepared ready for assembly beforehand. Either type of boat could be made up into a bridge, the gunwales being strengthened for this purpose; they could both be broken up after use and the timber used for other purposes.

Another light bridge was made out of Kapok floats and known as the Passerelle D'Infanterie (Infantry foot-bridge). This was designed to take Infantry in file or horsedrawn machine



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gun voiturettes.

The French rubber boat is not as good as the German; it takes longer to inflate and can be sunk by one bullet. This type was not very commonly used, a more popular float being the sac Habert. This is a large canvas bag which is filled with straw, grass, brushwood, etc., on the site. It is provided with straps and buckles for assembly into rafts. The load capacity of a raft is calculated on the basis of 880 pounds per sac.

d. Propulsion

No motor boats were provided in the French Army, but engineer units were issued with a number of well constructed 20 h.p. outboard propulsion units made by the firm of Goiot. They weighed 180 pounds and could be used with any of the standard pontons, wooden assault boats or rafts.

6. ANTITANK OBSTACLES

This subject has been fully covered in TENTATIVE LESSONS BULLETIN NO. 33, Paragraph II. E.

7. EXPLOSIVES, FUSES AND DETONATORS


a. Explosives

1. Melinite: The effect of Melinite is mainly cutting, but it was used also in mine charges. Melinite burns in free air without exploding. It was supplied in powder or slab form.

Melinite is either yellow, grey or brown in color and its uses are similar to those of gun cotton. The factor for cutting charges is 1.5 and for mine charges 1.0. Dry melinite powder can be detonated by the standard detonator or by instantaneous fuse if there is good contact.

2. Cheddites (Chlorates or Perchlorates): These are for use in mine charges (i.e. similar to ammonal). Cheddite explosives are sensitive to shock and catch fire at temperatures over 250° F. They were not popular with the French. They were issued in the following forms:

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|   | <u>Dimensions</u><br>(mm.) | <u>Total Weight</u><br>(Grams) |
|---|----------------------------|--------------------------------|
| Cylindrical cartridge<br>containing 100 gr. | 35 diam. x 95              | 130                            |
| Cylindrical cartridge<br>containing 135 gr. | 35 diam. x 115             | 160                            |
| Slab or petard<br>containing 1 kg.          | 100 x 50 x 100             |                                |
| Slab or petard<br>containing 10 kg.         | 170 x 170 x 200            |                                |

b. Fuses, Detonators, etc.

1. Meche Lente (Safety Fuse): Burns at the rate of 1 meter in  $1\frac{1}{2}$  minutes, or 2 feet 54.8 seconds. It burns slightly slower than the British type.

2. Allumeurs (Igniters): Pull, compression, or double action types.

3. Amorce Fulminante (Detonator): Service Detonator No. 1880, similar to and interchangeable with the British type, contains 1.5 grams of mercury fulminate. No. 7 Commercial Detonator contains a mixture of mercury fulminate and powdered melinite. The difference in diameter between the French and British is 0.02 inches. The two types are the same length, and the French pattern will fire the British standard dry gun cotton primer, but is not certain to fire German explosive charges.

4. Cordeau Detonant (Instantaneous Fuse): Burns at 7,000 meters per second; supplied in 50-meter lengths; lead-covered; T.N.T. filling. A second type has a tin covering and a melinite filling.

5. Amorce Electrique (Electric Detonator): Resistance, 1.35 ohms; tolerance, 0.5 ohm.

6. Insulated Cable (Electric): Resistance 22 ohms per kilometer; weight, 16 grams per meter; supplied in 150 to 200 meter lengths on drums.

7. Exploders: The Schaffler dynamo exploder was in general use. This is capable of firing detonators through a total resistance of 150 ohms.

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8. MINES, TRAPS, AND ALARM SIGNAL DEVICES

a. Antitank Mine

This is in the form of an oblong metal box, painted a neutral color with a corrugated contact lid, and provided with a safety rod. The mines are packed for transport in fours, the fuses being carried separately, 25 to a box. The French were not altogether satisfied with their mine and were experimenting with a mine similar in type to the German Teller, but the matter had not got beyond the experimental stage.

b. Mine Bondissante (60 mm. 1939 Model)

This is an anti-personnel mine throwing a 60 mm. caliber Infantry mortar shell into the air timed to explode at a height of between two feet and six feet six inches. The height at which the shell bursts depends upon the weight of camouflage material on the contact board; the most effective height is five feet above ground. The mine relies for its effect on fragmentation and can be operated horizontally as well as vertically. When used horizontally, the shell is thrown a distance of seven to eight meters before bursting. The mine is usually operated by means of a trip wire or contact board, buried in the ground and camouflaged. The effect of the explosion is to knock out all personnel standing or lying down within a radius of 10 meters, with the additional probability of serious injury up to 20 meters.

c. Mine Bondissante (75/81 mm.)

This was produced but has been discontinued in favor of the 60 mm. type. The mine worked on a similar principle, throwing a 75/81 mm. caliber mortar shell into the air. Operation was by the same means as the 60 mm., but the bursting height was in this case determined by a length of wire attached to the bottom of the mine and by the fuse in the nose of the projectile, which was jerked taut when the projectile was thrown into the air, thereby activating the igniter and exploding the shell.

d. Petard Coulissant (Sliding Suspended Mine, 1930 Model)

This consists of an explosive charge contained in a spherical-ended cylinder hung on a wire stretched double across a road between two supports at a height of not more than four feet nine inches above road level. When a vehicle runs into the wire, the safety pin is automatically extracted and the mine is drawn along the wire until it hits the side of the vehicle. The fuse

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in the mine is of sufficient length to allow the mine to be drawn to the vehicle before exploding, but there is no guarantee that it explodes on impact.

The mine weighs about 5 kilograms and contains 3.7 kilograms of melinite. It has been reported that the manufacture of this mine has also been discontinued, but in any case it is not thought that many were in existence.

This form of road block should be located as far as possible in blind sections of roads - that is, around corners, over crests, etc. - and should consist of more than one mine, arranged in depth. Dummy wires can be set up to cause delay, since they cannot be distinguished from those carrying a charge. Thus charges should therefore always be concealed.

e. Improvised Traps and Alarm Signals

French Engineer units were issued various electric contact devices for the operation of booby traps and alarm signals.

Devices were divided into three categories:

1. Tell tale (bell, lamp, etc.) alarms.
2. Flares or Very lights.
3. Anti-personnel.

The sensitivity of the electric contact devices made it possible for single cotton threads to be used as trip wires and thus Category 1, and possibly also 2, could be operated by enemy personnel without their having any indication that their presence had been betrayed.

9. FLAME THROWERS

The French had developed a flame thrower for use from inside a light tank. The range was from fifty to sixty yards, and the duration of one continuous stream was just over sixty seconds. The reservoir contained 130 gallons of fuel and was carried on a trailer. Pressure was generated by means of a 7 h.p. motor which pumped the fuel through a nozzle 18 mm. in diameter. Ignition was by means of a spark plug and a pilot jet. It is unlikely that there were any features which would be of particular interest to the Germans.

10. ELECTRICAL AND MECHANICAL

a. Field Searchlights

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Two types were issued to Engineer units - Types RFB and PRA, both made by Peugeot. The former has a single lamp, and power at 12 volts is supplied from a 2 h.p. motor generator through storage batteries. The latter has three lamps mounted together from three 6-volt batteries. The range of either type is about 200 meters.

b. Power Tools

A number of fairly efficient power tools were available for Engineer units in the field. Among the most recently adopted were:

1. The Rexo portable gasoline motor band saw which has an effective cutting width of 65 cm. and a speed in normal soft wood of about 1 cm. per second. This saw is more powerful and smoother working than the corresponding German saw, the Dolmar.

2. Rock picks and percussion rock drills, operated by built-in gasoline engines. These had passed their tests but were probably not available in quantity in June, 1940. They are fairly heavy and cumbersome to operate but have the undoubted advantage of doing away with motor compressor units.

3. The Benoto borer, which consists of a very heavy monkey controlled by a normal pile-driving winch with a grab at the lower end. It is used for placing mine charges or for boring wells down to about 50 feet, the hole being about 30 inches in diameter. This is a commercial standard equipment and most effective.

4. The Barre a Mine Binet, which is a type of road cratering equipment used for camouflet charges. It drives a hole of about 2 inches in diameter.

11. FRENCH CHEMICAL WARFARE

Prior to the capitulation a full exchange of views on chemical warfare took place between the French and British Chemical Warfare Staffs. All details of policy, design, production, stocks, and intelligence were freely disclosed, and French Chemical Warfare officers and scientists visited British manufacturing plants and research establishments.

In certain cases, specimen equipment was supplied to them. Anti-gas equipment, including masks, eyeshields, anti-gas ointment, etc., was captured from the B.E.F., and it is therefore almost certain that Germany is now in possession of the majority

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of British chemical warfare secrets. Among French stocks, now presumably in German hands, were large quantities of phosgene and toxic smoke generators.

The latter were large generators, known as Engin Z.5 which weighed 15 kilograms and contained  $4\frac{1}{2}$  kilograms of D. M. (diphenylamine chlorarsine). They functioned for about eight minutes and were intended to be used in groups of four, arranged to take over one from another to give a total period of emission of some 30 minutes.

The clouds produced have the usual yellow color characteristic of D. M. and under very favorable circumstances might cause at short ranges a minor degree of penetration of the British Mark IV service container and more serious penetration of the civilian duty and general civilian masks if not provided with the Contex. The latest type of service container, the Mark VI, gives complete protection against such clouds, although occasionally a smell of D.M. may be detected in the first few seconds of exposure after the respirator has been adjusted.

Another line of research to which the French attached considerable importance and secrecy was poison which might be applied to small shrapnel bullets, miniatures, arrows, etc.

The substance known as Zentin on the continent and as Daryl in Great Britain was specially considered. Its chemical name is Carbamyl Choline, and it is used in veterinary practice. A process for coating large lead shot with this substance had been worked out, and although the efficiency of such a device is considered doubtful as the normal toxicity of wounds is unlikely to be appreciably increased thereby, the possibility of its use by an enemy cannot, however, be ruled out.



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SPECIAL BULLETIN  
No. 19  
G-2/2657-231

MILITARY INTELLIGENCE DIVISION,  
WAR DEPARTMENT,  
Washington, October 5, 1940.

NOTICE

The information contained in this series of bulletins will be restricted to items from official sources which are reasonably confirmed.

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CONTENTS OF SPECIAL BULLETINS AND TENTATIVE LESSONS BULLETINS  
OCTOBER 6, 1939 - OCTOBER 3, 1940.

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NOTE

The abbreviations TL and SB are used to indicate Tentative Lessons Bulletin and Special Bulletin, respectively.

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- (12) French Tanks and Armored Cars
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- (10) Recommendations of a British Officer Based Upon Experience in the Belgian Campaign
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g. Italy

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SPECIAL BULLETIN  
No. 20  
G-2/2657-231

MILITARY INTELLIGENCE DIVISION,  
WAR DEPARTMENT,  
Washington, October 11, 1940.

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GENERAL REQUIN'S "LESSONS AND CONCLUSIONS"  
FROM OPERATIONS OF FRENCH FOURTH ARMY

SOURCE

This document is the last part of a lengthy report made in July, 1940, to the French General Staff by General Requin, who commanded The French Fourth Army during the Champagne operations. Previous comment by General Requin has been covered in TENTATIVE LESSONS BULLETINS No. 31 and 55.

In order to preserve the exact ideas of the author, the document presented here is a verbatim translation, unedited and unrevised.

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1. INTRODUCTION

An exhaustive study of the operations in June 1940 in CHAMPAGNE can only be made after a certain time has elapsed.

In fact, in order to make a worthwhile study, pertinent documents must be collected as well as the memories, opinions and suggestions of the qualified participants in these operations and above all, it must be undertaken with a free and serene mind.

At present too much passion is apt to upset both logic and reason.

However, among the numerous lessons that a study of the battle fought by the Fourth Army from the AISNE to the AUBE will bring to light, some can be determined immediately, for they impose themselves beyond any possible question. It will not be possible to question them later on even though legend and certain misleading versions replace the truth.

They set forth principally:

- (1) The essential causes of the enemy's success.
- (2) The modern solutions of certain tactical problems which are obvious and at the same time the insufficiency of our material means.

2. ESSENTIAL CAUSES OF THE GERMAN SUCCESS

Two words are ever recurring in the stories of the combatants:

- Tanks
- Aviation

They are simultaneously an explanation and a justification.

An explanation, because the German power, insofar as tanks and airplanes are concerned, is the very basis of the decisive successes of the Hitlerian armies.

A justification, for the lack of comparable means in our mobilized forces excuses the faint-hearted of certain combatants due to discouragement and proves to those who held their ground to the bitter end that, although vanquished, they are worthy of their forefathers.

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a. THE ARMORED WEAPON

It is the Arm of "Decision".

Its entry into action is preceded by classical attacks carried out by the Infantry and Artillery which, thanks to the effectiveness of airplane "dive-bombing", are more rapidly penetrating.

These attacks have as their object to insure to the armored units a "jumping-off place" for the conquest of bridgeheads beyond an obstacle (coupure, ditch, anti-tank works), or the creation of salients in a defensive position organized in depth.

With this objective in view, the Infantry launches an attack on a large front, en masse, with utter disregard of the losses. The effort of the attack is then brought to bear on the points of least resistance which have been disclosed.

As soon as the bridgeheads, or salients seem to be sufficiently deep, the Large Armored Units "go into action."

They create the event by their irruption in deep massive columns.

This is a modern charge going right ahead by successive echelons.

Launched slantwise, this charge will overcome the last resistance of the Infantry and anti-tanks.

The first tactical objective is: Overcome the whole position whose entire sides are outflanked, then encircled and this done, the charge continues by an exploitation conducted without interruption and having as objectives the vital rears of the Armies.

The Large Armored Units are kept informed, supported, and protected by Aviation in close liaison with their action.

They are followed up closely by motorized infantry and artillery columns which insure their security by day and night and open up for them, by actions of force, the passage of the gaps or narrow defiles that are held.

The development of this strategical exploitation is so rapid, that the reorganization of a constituted front in order to limit the effects thereof, becomes impossible even when the classical general reserve of Large Units and Artillery, are still available to attempt such action.

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The decisive breaking-through, tactically possible, but strategically an utopia during the last war of 1914-1918, has become a reality thanks to the use of Large Armored Units and Aviation for the exploitation.

In order not to be vanquished in a single large battle, one must oppose to the last man, the last tank, the last gun, the breaking-through of one's front; if worst comes to worst, it must be reorganized within the shortest delay possible.

To conquer, perhaps it may be sufficient to "break-through" the first.

b. THE AIR ARM

German aviation is the great conqueror of the war.

Without neglecting its role as an independent arm, with distant missions in enemy territory, which pertain to the general conduct of war, German aviation participated in the land battle with a power, a discipline and a dash to be admired.

On the front of the Fourth Army, it was without question permanently master of the sky.

Each day its bombers carried out the same program closely adapted to the operations on land:

- bombardments in a zone situated from 10 to 50 kms in rear of the front, of centers of communication, of important highways and railway lines, of halted troops, convoys and located depots.
- bombardment of important objectives: villages, bridges over large streams, cuts, etc., immediately ahead of the armored units and regulated directly by an officer belonging to these units. (\*)
- "dive-bombing" and machine-gunning of centers of resistance which opposed the advance of the Infantry, or still resisted though encircled.

(\*) The Army intercepted many radio messages sent in clear by an officer of the armored forces "controlling" directly the take-off and use of the aviation stationed on fields more or less near, supporting the operations of the tanks.

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The German Aviation cooperating with the land army constituted without doubt a true modern artillery, powerful, flexible and whose moral effect was crushing.

It took upon itself missions:

- of long distance interdiction and harassing fire.
- of protection of the independent operations of tanks at great distances.
- of furnishing direct support for infantry attacks.

Thus by its use the following problems were solved all at the same time:

- concentration of fires.
- observation of firing.
- instantaneous action.
- resupply of munitions during a combat.

The constant threat hovering over the troops wherever they were, certainly contributed to a great extent to diminish their capacity of resistance and their confidence in success.

c. However, if the Armored Arm and the Air Arm fulfilled the hope that an entire nation entrusted to them, and carried out the "Blitzkrieg" announced by Hitler, it is because they had available modern materiel in very large quantities, served by young and fanaticized crews ready for the supreme sacrifice.

Their triumph is the result of unrelenting effort during the first eight months of the war.

This effort was indispensable in order to have available before the launching of active operations on the Western front, a more powerful and more plentiful materiel than was had in September 1939 against Poland.

It was thus that on this date the 37 mm antitank gun was powerless against the French tanks - even the 35 R - as had been proven in the combats of the Fourth Army north of the BLIES. On the other hand, no German tank could withstand the fire of the 25 mm guns of our Infantry.

It was therefore necessary to put into service new anti-tank arms and new powerfully armored tanks.

As early as April 1940, a formidable program corresponding to these vital requirements was realized and HITLER assured his

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army that it could charge without fear of destroying its airplanes and tanks, for they would all be replaced as often as necessary until victory.

The German industrial power weighed fully in the balance and proved just what it could do.

3. PROBLEMS OF THE FOURTH ARMY, POSSIBLE SOLUTIONS AND NECESSARY MEANS

a. DEFENSE OF THE "COUPURES"

In this case, they are the rivers whose valleys are but relatively of little importance as obstacles, such as the AISNE, the MARNE, the AUBE and the SEINE in the part of their course which traverses the "CHAMPAGNE POUILLEUSE" region.

These rivers are of great importance to an enemy in a country essentially favorable to the use of tanks.

It sufficed to prohibit the crossing thereof by the Infantry charged with establishing a "bridgehead" indispensable to permit the construction of bridges, or the use of large size rafts and boats.

This problem is not new and its solution is classical.

But in the beginning of June, owing to the lack of available Large Units, the principle that "a coupure is only valuable if it can be properly held" was not respected.

Instead of a Division in line on a 10 Km front, 3 Divisions which had already suffered losses, were extended over a 45 km front in rear of the AISNE and its adjacent canal.

This weakness of the defense proved to be all the more serious because the Germans, after being sure that they were masters of the air, used very modern means and threw across the river masses of Infantry in order to be certain that sufficient forces, in spite of losses, would succeed in reaching the opposite bank.

The enemy attacking under such conditions on a very large front, took in the entire zone of the Army and outflanked the zone of the adjacent armies, pushing without hesitation large effectives against recognized weak points.

He thus succeeded in constituting several "bridgeheads" on the southern bank of the AISNE.

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Formerly, there would have been nothing much to worry about in such a situation. The Command "had the time" to take measures in view of:

- holding the hinges of the door opened in its formation,
- stopping at its source the arrival of reinforcements by artillery fire placed on the crossings of the river,
- bringing up reserves in order to set up the classical counter-attack on the flank in order to reduce the bridgehead.

Now, the problem is entirely different. The Command has but little time. The enemy Infantry must be thrown back before the tanks have had a chance to follow.

In fact, once the tanks have crossed the river, and no new antitank obstacle is in their way, experience has proven that for a normally dense formation (1 Infantry Division on a 10 Km front, reinforced by 1 Regiment of 75 mm Artillery) the fire of the antitank guns do not always stop the "tank charge".

Yet the effectiveness of these guns is generally adequate insofar as the 25 mm guns are concerned, and certainly insofar as the as the 47 mm and 75 mm guns are concerned.

But many rounds go amiss, and the "charge" in spite of the tanks put out of commission, continues to advance on the gunners of the antitank weapons who are bombarded without respite by dive-bombing airplanes.

Some hold their ground and finally fall, submerged or destroyed; others bewildered, weaken and give way before being actually in contact; while others, unfortunately, panic stricken, abandon their weapons without having used them.

How can the local Command reduce, in the shortest time possible a bridgehead which threatens the complete downfall of the entire defensive organization of the obstacle?

He must have reserves available on the spot, capable of brutally throwing back into the river the attacking Infantry, whether installed or not, even if some tanks have already succeeded in crossing.

Per Division, this reserve might include:

- 1 Infantry Battalion, General Reserve, entirely motorized:

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- 1 Troop of motorcyclist riflemen.
- 1 Troop of reconnaissance armored cars.
- 1 Troop of machine guns and antitank guns including:
  - 2 platoons of 47 mm (4 guns) on caterpillar automotive mounts.
  - 2 platoons of machine guns (8 machine guns)

1 Infantry Battalion

1 Tank Battalion (R.40 or F.C.M.)

Placed at a practical distance for intervening within one hour; under the direct command of the Commanding General of the Division. Such a reserve should be engaged as a whole under a single direction. It should insure its own reconnaissances, its own protection, occupy the regained terrain and re-establish the defense of the ravine or other obstacle.

If its intervention is not decisive, the breaking-through of the position is to be feared as soon as the enemy tanks are engaged.

The command will then fight, no longer for the "obstacle" but will endeavor to prevent any exploitation of the rupture of his position.

b. DEFENSE OF POSITIONS

The war of 1914-1918 witnessed on the Western front the triumph of "positions" and the uselessness of "exploitations" attempted after their rupture.

Even though not organized, a position on which the command accepted battle, held by Divisions reinforced by artillery and deployed on fronts of from 5 to 7 Kms, could not be broken through except by a "large scale" attack.

Such an attack was characterized by the use of considerable artillery well provided with munitions and by very dense Infantry (1 Bn per 200 or 300 meters of front).

Therefore it was first necessary to destroy the Infantry of the defense, or at least prevent it from using "its fire" which prevented any contact; then submerge the defenders under successive assaulting waves.

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It was only during the last year of the war that, thanks to new means, viz, powerful and mobile heavy artillery, poisonous gas, tanks, the rupture of a front became an operation whose success was certain provided one was willing to pay the price and that it was technically well set up.

However, will exploitation, decisive phase of the battle, be able to follow the break-through?

No, because the former arm of exploitation, the Cavalry, has lost all offensive power in front of modern arms; a sheet of fire overcomes it, and Infantry, too slow, will advance all the more slowly because it will lack the support of Artillery, for even the field artillery will follow with difficulty across rough terrain.

Furthermore, all Infantry and Artillery actions are of a mechanism incompatible with the rhythm characterizing a "pursuit".

Finally, the necessary time for the emplacing of the means for a breaking-through attack, the duration of the preparation, the slow advance from objective to objective, have always given the defender the possibility of bringing up reserves:

- either to avoid a complete break-through.
- or to stop the breach opened in his front.

If worst comes to worst, after a total surprise (Chemin des Dames in May 1918), or an initial success of an unforeseen extent (Somme-Oise, March 1918), the arrival of reserves by rail or trucks limited the exploitation of the break-through to the creation of a "salient" more or less deep.

In conclusion, no deep strategical exploitation was possible with the means available to the belligerents. The British tanks "Whippels" raised the hopes of new possibilities, but their belated entry into service and their small number did not permit any realization of the possible action of rapid tanks in rear areas.

The decisive exploitation having as objective the mastery of communication centers, the disorganization of the command and of the reserves and even the encircling of complete armies attacked in their rear, having failed of accomplishment, the close-in exploitation materialized by a "salient" (\*) was alone sought during the decisive battle engaged by Marshal FOCH July 12, 1918.

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(\*) It was conceded that "salients" could not exceed a depth equal to half of their base.

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The break-through operations of the Allied Armies carried on at a rapid pace thus, salient after salient, dislocated the entire German front and obliged LUDENDORFF to engage all his reserves in order to maintain a united front.

Without reserves, no stopping of a breach was possible. The next break-through battle was no longer to end in "salients" but by a strategical exploitation, which the total wearing down of the German Army foreshadowed as being decisive. To avoid this, vanquished Germany asked for an armistice.

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As early as July 1940, may one already conclude - as some have asserted after the operations of May-June 1940 - that the system of war of "positions" is over?

The rapid success of the Germans in all the break-through battles, even those covered by an obstacle, would seem to prove this.

But it must not be overlooked that the defense of the positions attacked would have seemed hazardous even in 1914-18 owing to:

- combat fronts too extended (15 to 30 kms per Infantry Division).
- the absence or weakness of obstacles (entanglements in particular).
- lack of reserves.
- the mediocre quality of Large Units in personnel and material (the value of a position is that of its weakest sector).

Their break-through was therefore unavoidable.

It was all the more rapid due to the new means applied:

- Dive-bombing airplane attacks demoralizing the defenders;
- Attacks of armored weapons which found no obstacles nor antitank guns in sufficient quantity in front of them.

The results of the combats which took place between the Aisne and Marne show that the value of a position depends essentially on the antitank obstacles available.

Without such obstacles, set up in depth, the attack of armored weapons passes through, in spite of the fire of antitank guns of all calibers: (25 mm, 47 mm, 75 mm.).

Whatsoever may be their losses, the armored weapons, not being able to avoid the hits by dropping to the ground as does the Infantry, charge at top speed to overcome and go beyond the antitank arms.

There are always some which succeed in doing this.

The position is then broken through, and through the breach, however narrow it may be initially, new masses of tanks, followed soon by motorized Infantry and Artillery, are going to pass.

It is the beginning of a close-in exploitation carried on by the weapons which have broken through, having as objective the disorganization of the rear areas of the position, to complete tactically the success and to open the door to the deep strategical exploitation which will follow without loss of time.

What solutions may already be contemplated to check the attacks by tanks against positions not leisurely organized, or in other words, not fortified?

Two suggest themselves immediately:

- Increase the number of antitank weapons.
- Oppose to the tanks obstacles which can be quickly set up.

(1) Increase the number of antitank weapons?

Yes, but only where the attack takes place.

In fact, to equip similarly an entire position, is to willfully not use 9/10 of the guns, as the armored tanks attack on narrow fronts, since the slightest breach is sufficient for them.

It suffices therefore to be able to concentrate at the desired point and in due time the necessary antitank weapons. To do this, the Command, beginning with the Army Corps echelon, should have available mobile and powerful antitank guns.

(2) Oppose to the Tanks new obstacles? which ones?

Mobile obstacles: tetrahedrals in steel tubes,

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X is rails or cornered iron, felled trees, etc...are very heavy, and the total tonnage necessary to transport them and put them in position would require considerable time: weeks.

Their use is therefore limited to the framework of fortified positions except in the case of defiles.

Alone, light mines (6 Kgs) which can be rapidly and simply put in place are liable to constitute an effective antitank obstacle.

All Infantry and Artillery units, down to the echelons company and battery, should be provided with them.

In front of a position consisting of successive lines of antitank obstacles, the enemy would have to prepare an Infantry attack, therefore slowly developed.

This position, even conquered, will always constitute a "cut" from which the tanks will have to debouch by certain itineraries reestablished for them.

All these operations of conquest and preparation for crossing an obstacle will again permit the defense Commander to make his dispositions:

- Occupation by the reserves of one or two salients partitioning the rears of the position attacked, these salients being protected in turn by obstacles and mines;
- or assembly of antitank means, of large mechanized units and aviation to prevent the enemy's armored and motorized forces from debouching on the rear of the position, in a terrain free from obstacles.

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In sum, a modern position must include obstacles which will require THAT A PREVIOUS Infantry attack be necessary, or that the advance of a tank attack be considerably slowed down.

The antitank armament of units holding this position on normal fronts need not necessarily be reinforced.

The Command must have available:

(1) Batteries of powerful and very mobile antitank guns (on cross-country vehicles) to follow the maneuver decided upon:

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- oppose in time the enemy tanks debouching;
- support the counter-attack organized by the Large Armored Units;
- maneuver in retreat in front of the enemy mechanized forces making the exploitation.

These batteries on motorized mounts should be of a caliber from 75 mm to 90 mm; either

- for antiaircraft fire, batteries that require but a few minutes to go into position; or,
- for normal firing.

They should be included in the Corps Artillery (1 bn. of 3 batteries), as well as in regiments of general reserve.

In principle, Army Artillery should include 1 Regiment of this type.

#### (2) Large Armored Units

- to prevent the debouching of enemy tanks;
- to fight a battle of annihilation with forces of exploitation which have succeeded in debouching.

These Large General Reserve Units should have as a basis very heavily armored tanks:

- some small and speedy;
- others heavy, slower perhaps, but heavily armed.

All should have:

- a duration of combat action of at least 15 hours; (\*)
- munitions for several days;
- food supplies and water for 4 days in a baggage locker.

One reconnaissance squadron should be an organic part of the Large Armored Unit.

Each Army should normally have one Large Armored Unit, except armies occupying fortified positions.

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(\*) 10 hours of which at an average cruising speed of 30 km per hour for the small tanks and 20 km per hour for the heavy ones, in average terrain.

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This Large Unit should always be engaged "as a whole" and hence organized for action "as a whole" and with rapidity at the same time.

(3) Pursuit aviation, to neutralize the action of dive-bombers and to aid the morale of the defenders.

Dive-bombing aviation to attack:

- the bridges if the obstacle is a cut;
- the tanks while they are crossing the obstacles in column;
- the Infantry and the batteries, during the entire battle.

The land army must direct this air action closely linked with its OWN OPERATIONS.

Dive-bombing aviation represents for the Commanding General of the Army his real Army Artillery. This organic Air Artillery should include as a minimum:

- 1 Groupment of 3 Groups of 3 squadrons each; that is, about 80 operating planes always available.

The summary expose above shows obviously how difficult it was, beginning May 26th, to hold on a front extending from the Bay of the Somme to MONTMEDY, before an adversary having at his disposal the most modern means, which he engaged regardless of cost.

In fact, we lacked everything at the same time:

- effectives, to such a degree that the Large Units constituting the main body of the army were extended over large fronts and reserves were few;
- modern materiel: tanks, airplanes, motorized antitank guns, mines;
- the necessary time to organize strong positions.

The grim determination to resist to the end was even lacking in certain units.

c. RETREATING MANEUVERS

Faced with the coordinated action of Aviation and tanks supported by motorized Infantry and Artillery units, it is no longer possible to carry out a retreating maneuver in open country with Large Units of a normal type - not to mention a retreating combat such as the Fourth Army was compelled to do in CHAMPAGNE.

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As a matter of fact, the "fire curtains" which formerly permitted the breaking-off by night after having held the entire day, are swept aside by the tanks.

The resistance nests holding the centers of communications are either outflanked by mechanized and motorized columns, or if their capture is necessary they are crushed by bombing aviation and mopped up by the motorized forces.

The Large Units, once ordered to withdraw, can not, under these conditions, prevent the total dissociation caused by the action of the tanks which outspeed them and reach their rear.

Only the motorized elements of these Large Units can avoid being encircled and can re-assemble in rear of a protecting obstacle, or a new position duly held.

Isolated men can sometimes succeed in "passing" through the advance of the armored weapons and rejoining these motorized elements.

However, on the immense battlefields of today, events may oblige the Command to order a retreating maneuver on a certain front.

How can this be carried out successfully?

(1) Foot elements of the Large Units must be allowed to move away rapidly. The mission of holding up the advance of the armored and motorized enemy columns is then left to rear-guards composed of mechanized UNITS REINFORCED BY ANTITANK ARTILLERY. (\*)

Hence, the double necessity for the army concerned to have available:

- motor transport for the Infantry of the Large Units, it being understood that the Artillery, Engineers, Train, etc., of these units are motorized organically.
- mechanized units and antitank units. (\*)

(2) As close as possible in rear of the position whose evacuation has been necessary the following should be held:

- either the passages of an obstacle which tanks can not cross;
- or a new organized position with antitank obstacles.

(\*) 75 mm, 80 or 90 mm guns on motorized cross-country mounts.

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(3) Finally pursuit and bombing aviation capable of acting in liaison with the rear-guards should be available.

In sum, for the defense of obstacles and positions, if success is to be had, modern means must be available: Aviation, Tanks and antitank guns, all characterized by power and mobility.

Horse-drawn or foot means can not compete with motorized means.

The retreating maneuver, or rather the retreating combat carried out by the Fourth Army between the AISNE and the MARNE, illustrates particularly well the conclusions stated above.

On the 10th and 11th of June, thanks to the intervention of the 7th Light Motorized Division and the 3rd Armored Division still representing a real force, the front of the Army was held together.

On the 12th of June, it was ruptured, separating the 8th and 23rd Corps.

The Germans were able to develop on the flank in the direction of RHEIMS-CHALONS, the action of the tanks reinforced by new units, which the absence of our bombing aviation enabled them to bring up by way of BERRY au BAC.

On the contrary, the situation of the Fourth Army on the MARNE west of DAMERY, obliged the Commanding General of the Fourth Army to use in the emergency the main body of the 7th Light Mechanized Division at the time it was returned to it by the 4th A.G. to save its left wing.

The few tanks remaining in the 3rd Armored Division and a small detachment of the 7th Light Mechanized Division, therefore remained alone confronted with 4 Panzer Divisions which were kept informed, protected and supported by numerous airplanes.

The breach was thus more easily opened up in the formation of the Army, followed by the development on its rear, the close-in exploitation in the direction of CONDE sur MARNE - CHALONS, and by the exploitation in depth launched on the axis: CHALONS, VITRY, ST. DIZIER. The latter continued without interruption in the direction of LANGRES, DIJON and the SAONE.

The desperate resistance of the defense in the region of MOURMELON did not permit the enemy elements of the close-in exploitation to reach the rear of the 8th Army Corps, which endeavored to withdraw, east of VITRY, back of the obstacle MARNE-SAULX. All its

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motorized elements succeeded in arriving there. But the distance to be covered (50 to 60 kms) was beyond the possibilities of the horse teams and of the men harassed by four days of battle and three of withdrawal.

Constituted detachments and isolated men succeeded nevertheless during the night of June 12-13th and the day of June 13th in reaching the region South and Southwest of VITRY.

Thanks to the obstacle of the MARNE, whose passages were all held, the Commanding General of the Army expected to regroup the remains of the 8th and 23rd Army Corps.

It seemed as though this maneuver, the only one which could be attempted, might possibly succeed; however, the enemy's advance in the direction of MONTMIRAIL - SEZANNE and the SEINE at ROMILLY, did not permit the MARNE to fulfill its contemplated checking role.

During all these operations between the AISNE and the MARNE, German Aviation never ceased to prepare and accompany the advance of the armored and motorized columns, to paralyse our movements, our supply services and our evacuations, and to disrupt all our telephone communications by launching continuous waves of planes, thus hampering considerably the exercise of command.

Our own pursuit aviation never once opposed these activities.

No friendly aviation participated in the struggle on land, to check the German exploitation, to help the breaking-off of our troops or their crossing of the MARNE bridges.

This difference of air activity weighed heavily on the execution of the retreating maneuver of the Fourth Army.

d. CLOSE-IN COUNTER-ATTACKS

The few close-in counter-attacks carried out within the framework of the Infantry Division by 35 R Tanks accompanied by Infantry, proved their effectiveness.

At times, the enemy, panic-stricken when the tanks debouched, left many prisoners in our hands.

It seems to have been proved that German Infantry does not hold any better than our own when faced with a sudden intervention of tanks.



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e. COMBAT BETWEEN MECHANIZED UNITS

Our mechanized units had the arduous mission of stopping and sometimes throwing back the Panzer Divisions in order to free strong points which were threatened or encircled.

In spite of the unquestionable value of the German materiel engaged beginning with May 1940, our tanks of every type proved their superiority in combat.

They lacked only radius of action, and gasoline being exhausted, they had to be destroyed oftentimes by their own crews so that they should not fall intact in the hands of the enemy.

Furthermore, the composition of the Large Units and the technical and tactical methods of their use entailed delays too prolonged for going into action.

For example, the attack of the Armored Groupment (\*) on June 10th on both banks of the RETOURNE, could not be launched until 7 hours after the order for it had been given.

For the success of such an attack its suddenness, which permits the exploitation of a known situation, and the brutality of the charge straight ahead in a given direction until a final definite objective is reached, are more important than clever maneuvering which merely disrupts the cohesion as a whole and diminishes the effect of mass, decisive factors of a shock action.

Finally, the game between our armored units, left to their own forces, and the Panzer Divisions, was not equal.

The FLAK (antiaircraft) guns, very mobile in cross country and very powerful (77 mm), opening fire within a few seconds, accompanied these Panzer Divisions, as well as numerous airplanes which, with unlimited activity and abnegation, informed, supported and protected them constantly.

In these new operations between Large Armored Units it is, as always, the combined action of the arms which wins the day.

The Aviation and Artillery must fight for the benefit of the principal arm of the attack: the Tanks.

With this object in view, they must have specialized

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(\*) Including the 3rd Armored Division and the 7th Mechanized Light Division.

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materiel equipping their units which, in turn, must be trained to maneuver with tank units.

f. EVACUATIONS

(1) Civilian Evacuations

The stability of the front of the Army the 9th and 10th of June and the reduced size of the successive withdrawals up to June 13th (inclusive) in a region sparsely populated, enabled civilian evacuation to take place according to a preconceived plan without too much congestion of the main highways.

However, beginning at midnight June 13th civilian evacuation turned into a panic and the civilian authorities, taking entirely the place of the Army Commanding Generals, were themselves swamped.

The highways became useless for all military requirements, even to effect simple liaisons.

The dissociation of retreating units ended in a non-descript rout; there was nothing on the highways except intermingled civilians and military fugitives.

What measures should be taken to avoid such disorder in the rear areas and free the highways to serve the battlefield?

They should be exactly those provided for in September 1939 at the time of mobilization, in the case of populations protected by a fortified position.

Back of such a position an entirely evacuated zone of from 10 to 15 kms in depth, should be created.

On the other hand, back of fronts weakly held and in rear of an active front, no movement of motor or horse-drawn vehicles, or of personnel on foot should be tolerated.

Each civilian, whoever he may be, private or official, should remain home or at his post. Danger is less great there than on the road where the congested convoys offer particularly easy and vulnerable objectives to aviation.

Dissemination (\*) will be the rule only in centers

(\*) That is to say, the partial evacuation of the center or of the vital points of the populated area, for the purpose of seeking cover in the immediate vicinity.

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situated in rear of active fronts and where air attacks could not be preceded by an "alarm".

As in the days prior to the advent of the automobile, certain people will suddenly find themselves in the midst of operations. That is one of the terrible eventualities of war which a strong nation must envisage without fear.

## (2) Military Evacuations

These are always necessary to avoid leaving the personnel and materiel of the abandoned territory in enemy hands.

However, these evacuations should begin in sufficient time and should be carried out normally by rail, even insofar as the automobile materiel is concerned.

In this manner certain evacuations, resembling "flights" and sometimes even the actual abandoning of posts, will be avoided. The highways will not be crowded with an inextricable mixture of elements from the armies and from the territory, the latter hastening the dissociation of the former.

Finally, to settle definitely the question of evacuations, it is important to envisage them as useful and possible only when reduced in size and echeloned in time. What we saw in June 1940 was not an evacuation but the modern migration of a nation before the victorious invader.

## 4. CONCLUSIONS

From the study of the events of June 1940 on the front of the Fourth Army, three main lessons may be drawn:

a. In the offensive, the use of the system of force: Tanks-Aviation, is the modern formula of a decisive attack.

However, it should be prepared by preliminary Infantry action if the enemy is holding behind a cut, or occupies a position protected by antitank obstacles.

b. In the defensive, a position can only be held if provided with antitank obstacles.

It is erroneous to contend that antitank arms are to armored vehicles what the machine gun is to Infantry.

Even in open country, machine guns are masters of their

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fire and pin to the ground any Infantry attack, while antitank guns under similar conditions do not stop the charge of tanks.

It is by combining obstacles with antitank guns that the defense of a position can:

- either be carried on to the very end (in case of a fortified position);
- or that it can hold long enough for the Command attacked to be able to deploy advantageously his antitank artillery and dispose his maneuvering reserves.

c. A Large Mechanized Unit should include, in addition to its miscellaneous armored vehicles and motorized infantry:

- Artillery on mechanized mounts,
- Reconnaissance and dive-bombing aviation.

On the other hand, to benefit by the other lessons set forth above, one should not lose sight of the very special conditions which characterized the operations of the Fourth Army in CHALPAGNE between the AISNE and the MARNE.

(1) Initial Situation

Belated taking up of position, organization of the Command effected at the last moment (engagement of the organic elements of the VIII Army Corps on the 8th of June only) absence of Army Services which did not rejoin.

(2) Strength of the equipment used by the Germans:

- 4 Armored Divisions
- 2 Motorized Divisions
- 12 Infantry Divisions

strongly supported by a powerful aviation, facing initially:

- 3 and later 4 Infantry Divisions
- 1 armored division incomplete
- 1 Light motorized division recently organized without any appreciable air forces.

(3) Form of Battle

- At first, frontal attack:

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On the AISNE, already crossed by the enemy in the West, and continued in CHAMPAGNE POUILLÉUSE by a retreating maneuver to a depth of 80 kms, for the purpose of reaching the MARNE.

The absence of reserves in fact obliged the troops to fight while retreating, the same units fighting throughout the day after having withdrawn during the night.

- On the Left Wing as of June 11th the battle extended progressively to the south of the Marne the 11th and 12th owing to the deep withdrawal of the Right wing of the Sixth Army whose VII Army Corps could no longer insure liaison with the Fourth Army.
- Decisive Intervention of the Panzer Divisions on June 12th, which took advantage of the over-extended Left wing of the Fourth Army and attacked in two directions:

RHEIMS - CHALONS  
DAMERY - EPERNAY

This crushed the XXIII Army Corps, some of whose elements succeeded in crossing the MARNE, and separated it from the VIII Army Corps whose withdrawal was carried out partly East of VITRY-le-FRANÇOIS under particularly difficult conditions.

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